National Aeronautics and Space Administration

FINAL

# SUPPLEMENTAL FIELD INVESTIGATION DATA REPORT REVISION 2

# OPERABLE UNIT 7 FORMERLY USED DEFENSE SITE PROJECT 15 CONSTRUCTION DEBRIS LANDFILL

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

**June 2022**

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Final

# Supplemental Field Investigation Data Report
# Revision 2

## Operable Unit 7
## Formerly Used Defense Site
## Project 15 Construction Debris Landfill

**National Aeronautics and Space Administration**
**Goddard Space Flight Facility**
**Wallops Flight Facility**
**Wallops Island, Virginia**

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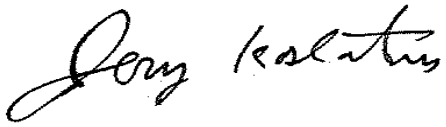

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# Acronyms and Abbreviations

| | |
|---|---|
| µg/kg | micrograms per kilogram |
| µg/l | micrograms per liter |
| 1,1,2-TCA | 1,1,2-trichloroethane |
| 1,2-DCA | 1,2-dichlorethane |
| 1,2,3,4,6,7,8-HpCDD | 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin |
| 1,2,3,4,6,7,8-HpCDF | 1,2,3,4,6,7,8-heptachlorodibenzofuran |
| 2,3,7,8-TCDD | 2,3,7, 8-tetrachlorodibenzodioxin |
| 3-D | three-dimensional |
| ALM | Adult Lead Methodology |
| amsl | above meal seal level |
| AOC | area of concern |
| BEHP | bis-2(ethylhexyl)phthalate |
| BERA | Baseline Ecological Risk Assessment |
| bgs | below ground surface |
| BHHRA | baseline human health risk assessment |
| BTAG | Biological Technical Assistance Group |
| BTEX | benzene, toluene, ethylbenzene, and total xylene |
| CDM Smith | CDM Federal Programs Corporation |
| CDL | Construction Debris Landfill |
| CENAB | U.S. Army Corps of Engineers-Baltimore District |
| cis-1,2-DCE | cis-1,2-dichloroethene |
| CSM | conceptual site model |
| COPC | chemical of potential concern |
| COPEC | chemical of potential ecological concern |
| CTE | Central Tendency Exposure |
| DCE | dichloroethylene |
| DDD | dichlorodiphenyldichloroethane |
| DDE | dichlorodiphenyldichloroethylene |
| DPT | direct push technology |
| DQO | data quality objective |
| DRM | dose rate model |
| ECSM | ecological conceptual site model |
| ELCR | excess lifetime cancer risk |
| EPA | U.S. Environmental Protection Agency |
| EPC | exposure point concentration |
| ERA | ecological risk assessment |
| ESL | ecological screening value |
| FS | feasibility study |
| FSP | field sampling plan |
| ft | feet |
| FUDS | Formerly Used Defense Site |
| gpd/ft | gallons per day per foot |
| HI | Hazard Index |
| HHRA | human health risk assessment |

## Acronyms and Abbreviations (continued)

| | |
|---|---|
| HMW | high molecular weight |
| HQ | hazard quotient |
| HTRW | hazardous, toxic, and radioactive waste |
| LMW | low molecular weight |
| LSI | Limited Site Investigation |
| MADEP | Massachusetts Department of Environmental Protection |
| MCL | Maximum Contaminant Level |
| mg/kg | milligram per kilogram |
| mg/l | milligram per liter |
| MIBK | 4-methyl-2-pentanone |
| MIP | membrane interface probe |
| MW | monitoring well |
| NASA | National Aeronautics and Space Administration |
| OCCD | octachlorodibenzodioxin |
| OCDD | octachorodibenzo-p-dioxin |
| ORP | oxidation-reduction potential |
| OU7 | Operable Unit Number 7 |
| PAH | polycyclic aromatic hydrocarbon |
| PbB | blood lead |
| PCE | tetrachloroethene |
| P.G. | Professional Geologist |
| pg/g | picogram per gram |
| pg/l | picogram per liter |
| PID | photoionization detector |
| QAPP | quality assurance project plan |
| RI | remedial investigation |
| RME | Reasonable Maximum Exposure |
| RPD | relative percent difference |
| RSL | Regional Screening Level |
| SAIC | Science Applications International Corporation |
| SFI | supplemental field investigation |
| SLERA | Screening Level Ecological Risk Assessment |
| SMDP | scientific management decision point |
| SVOC | semi-volatile organic compound |
| TAL | target analyte list |
| TCA | trichloroethane |
| TCL | target compound list |
| TCDF | tetrachlorodibenzofuran |
| TCE | trichloroethene |
| TEF | toxicity equivalent factor |
| TEQ | toxicity equivalency quotient |
| TOC | total organic carbon |
| µg/dL | micrograms per deciliter |
| U.S. | United States |
| USACE | U.S. Army Corps of Engineers |

## Acronyms and Abbreviations (continued)

| | |
|---|---|
| USATEC | United States Army Topographic Engineering Center |
| Versar | Versar, Inc. |
| VOC | volatile organic compound |
| VWQC | Virginia Water Quality Criteria |
| WHO | World Health Organization |
| WFF | Wallops Flight Facility |

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# 1. Introduction

AECOM Technical Service, Inc. (AECOM), on behalf of the National Aeronautics and Space Administration (NASA), updated this supplemental field investigation (SFI) report for the Restoration Program, Operable Unit 7 (OU7), Project 15 Construction Debris Landfill (CDL) feasibility study (FS) at the Wallops Flight Facility (WFF) Formerly Used Defense Site (FUDS), Wallops Island, Virginia (**Figure 1-1)**. The National Aeronautics and Space Administration (NASA) Goddard Space Flight Center WFF qualifies as a USACE FUDS property pursuant to the Environmental Restoration Defense Account and the Defense Environmental Restoration Program, Chapter 160 of the Superfund Amendments and Reauthorization Act of 1986. As part of the USACE FUDS program, USACE-Baltimore District (CENAB) is responsible for oversight of USACE FUDS activities at the former WFF-FUDS.

This work is being performed under contract number 80KSC019D0010, delivery order 80GSFC20F0047with NASA, under the ongoing authorized Environmental Contract.

## 1.1 Objective

USACE investigated four areas of concern (AOCs) at the Project 15 CDL (the Site) in a remedial investigation (RI) and reported results of the investigation, including a human health risk assessment (HHRA) and an ecological risk assessment (ERA), in the *Final Remedial Investigation Report, Remedial Investigation of the Construction Debris Landfill, NASA Wallops Flight Facility, Accomack County, Virginia* (Versar, Inc. [Versar] 2013). The findings of the RI were used to develop remedial alternatives presented in the *Draft Final Feasibility Study Report for the Construction Debris Landfill, NASA Wallops Flight Facility, Accomack County, Virginia* (Versar 2012). Following submission of the draft final feasibility study report, USACE determined that additional information was required to refine the remedial alternatives.

The purpose of the SFI was to collect data to further define the extent of the debris in the CDL and determine if there is contamination in the deep surficial aquifer groundwater. If contamination was found in the deep surficial aquifer, the potential for contamination of the underlying upper Yorktown aquifer would be assessed. This information and the data from the RI were used to refine the alternatives developed for the Revised Draft FS (CDM Smith 2018).

After the initial scoping of the SFI, additional data collection activities were conducted to provide data required to update the HHRA and ERA and report the changes in HHRA and ERA addenda.

## 1.2 Report Organization

This SFI report has been prepared to present and describe the results of the supplemental field investigation and risk assessments performed after the draft final FS. The remainder of the report is organized as follows:

- Section 2 –Site Background. The physical site characteristics, a history of facility operations, and a summary of the RI findings are presented in this section.
- Section 3 – Supplemental Field Investigation. This section provides a description of the supplemental field investigation work.

- Section 4 – Analytical Results and Distribution of Contamination. This section provides tabular summaries of analytical data and observations as well as graphical depictions of the extent of debris and groundwater contamination. The nature and extent of contamination in soil, groundwater, pore water, and sediment are presented.
- Section 5 – Fate and Transport and Conceptual Site Model. This section provides a brief description of the fate and transport characteristics of the significant contaminants of concern (those contaminants that drove risk in the HHRA and ERA). The section also provides a conceptual site model (CSM) of contaminant migration through the site environment.
- Section 6 – Summary of Risk Assessment Addenda. The results of the HHRA and SLERA Addenda (presented in full in Appendices F and G, respectively) are summarized in this section.
- Section 7 – Conclusions. The significant conclusions of the SFI are presented in this section.
- Section 8 – References. Provides a list of sources cited in the preparation of this report.
- Appendix A – Trench and Direct Push Technology Logs. Trench and boring logs are presented in this appendix.
- Appendix B – Temporary Well Construction Diagrams. Shallow and deep surficial aquifer temporary well diagrams are compiled in this appendix.
- Appendix C – Supplemental Field Investigation Analytical Data. Full analytical data tables, with detection limits, are compiled in this appendix.
- Appendix D – Data Validation Reports. Data validation reports produced by third party validators are presented in this appendix.
- Appendix E – Duplicate Pair Analytical Data. Duplicate pair analytical data are presented in this Appendix.
- Appendix F – Human Health Risk Assessment Addendum. The results of additional human health risk evaluation are presented.
- Appendix G – Ecological Risk Assessment Addendum. Results of the screening of additional ecological risk evaluation are presented.

# 2. Site Background

The site background information presented includes information most relevant to the presentation and interpretation of the supplemental data collected during the SFI and the refinement of the site-specific CSM. This includes the site location, operational and environmental investigation history, geology, hydrogeology, drainage, and groundwater use. Information on the topography, demography, climate and ecological setting can be found in the final RI report (Versar 2013).

## 2.1 Site Location

WFF is in Accomack County, Virginia, on the Atlantic Coast of the Delmarva Peninsula (**Figure 2-1**), approximately 5 miles south of the Maryland/Virginia state boundary, and immediately west of Chincoteague Island. Bounded on the north and east by Little Mosquito Creek, Simoneaston Bay to the east, and Wattsville Branch to the west, WFF sits just above mean sea level (amsl) at 20 to 30 feet amsl. WFF consists of three separate land areas: Wallops Main Base, Wallops Mainland, and Wallops Island (**Figure 2-1**). The Project 15 CDL is located northeast of the runways on the approximately 2,230-acre Main Base.

## 2.2 Site History

The site ownership and use, as summarized from the final RI (Versar 2013), is presented in this section.

Prior to development of the Site by the U.S. government, the current WFF property was farmland and marshland. The Department of Navy acquired the property in 1942 and established a World War II training facility, the Naval Auxiliary Air Station, for naval aviators. The original runways and buildings have been modified and extended, as needed, to accommodate the evolving mission of the facility. Accordingly, the WFF property has experienced periods of construction and demolition of runways, buildings, and roadways.

The Navy discontinued naval training operations at the facility in 1959 when NASA took custody of the Main Base as well as the northern portion of Wallops Island and the Mainland; the property transfer was finalized in 1961. From 1959 to 1974, the three areas were known as Wallops Station and were used for support of the Civilian Space Program.

NASA excised approximately 397 acres of the Main Base to the U.S. Fish and Wildlife Service in 1975. The official facility name was changed to Wallops Flight Center that same year. In 1981, Wallops Flight Center was consolidated with Goddard Space Flight Center, and the name of the facility changed again to Wallops Flight Facility. WFF is currently used as a suborbital and orbital rocket launch site to support NASA and other state and federal missions.

### 2.2.1 Site Operational History

Analysis of historical aerial photographs, as reported in the RI, document a series of ground scars indicative of waste disposal between 1949 and 1963. Most indications of excavation and fill were not apparent on photographs taken in 1974. Investigations, described in Section 2.2.2, confirmed that the area had been used for disposal of construction debris and ash.

### 2.2.2 Site Investigation History

As described in the final RI report (Versar 2013), the Project 15 CDL site was discovered in 2000, when the United States Army Topographic Engineering Center (USATEC) produced a historical analysis report of area ground scars, disturbances, channels, and other activities at WFF dating back to pre-United States (U.S.) involvement in WWII (USATEC 2000). The analysis of aerial photographs revealed several ground disturbances in the northeast corner of WFF that are clearly visible in 1949, 1954, 1959, and 1963 aerial photographs. By 1963, some of these features were no longer visible, and by 1974, none of them remained visible (USATEC 2000). Based on the aerial photographic analysis, four AOCs within the CDL, shown on **Figure 2-2,** were defined and named with respect to their geographic position to each other: Northern, Central, Southern, and Western AOCs**.** In previous investigations, these AOCs have also been described by the nature of their apparent historical site use:

- Northern AOC – Disturbed Ground – This AOC was an area of disturbed ground in 1949 that was an excavation in 1954.
- Central AOC – Mounds of Material – This AOC was an area with several mounds of unidentified material in 1954 and was an excavation by 1959.
- Southern AOC – Burning Dump – This AOC was an area of disturbed ground with two man-made channels; the AOC's use as a burning ground was confirmed on a 1950 site map.
- Western AOC – Shallow Excavation – This AOC is interpreted to be a shallow excavation that is now located inside the runway area fence.

In 2001, the Department of Defense and USACE assumed responsibility for various sites, including the CDL, under the FUDS program. Since then, the AOCs have been the subject of four prior investigations:

- a limited site investigation (LSI) in 2002 conducted by Science Applications International Corporation (SAIC 2003)
- a forensic soil sampling and analysis event
- a soil gas investigation in March and April 2004
- an RI conducted in 2007

Data from the RI were used to develop the draft FS. Data from the RI also informed the planning of the SFI field activities and are used with the SFI data presented in this report to refine the CSM.

In addition, NASA conducted a site background soil and groundwater investigation for the Main Base in 2004 to provide data to represent background conditions at WFF. The background data sets are used for comparison in site-specific studies such as the Project 15 CDL RI and SFI.

#### 2.2.2.1 Limited Site Investigation – 2002

In 2002, SAIC conducted an LSI and collected soil and groundwater samples from the areas southeast of the Central and Southern AOCs. Information about the LSI presented here is summarized from the final RI report (Versar 2013).

The objective of the investigation was to determine if past activities had contaminated soil and groundwater near the AOCs. Samples were collected from three direct push technology (DPT) borings (SB-CDL-01, SB-CDL-02, and SB-CDL-03). SB-CDL-01 was located east of the southern end of the Central AOC; SB-CDL-02 and SB-CDL-03 were located east of the Southern AOC. The RI report noted that the exact locations of SB-CDL-02 and SB-CDL-03 are not known. Significant findings from the LSI include:

- In SB-CDL-02, a black sheen with associated volatile organic vapors was found from 7.5 to 16 feet below ground surface (bgs) (the bottom of the borehole). Soil samples were collected from immediately above and below the water table and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals, and mercury. A groundwater sample was also collected (the depth of the sample is not known).
- A variety of polynuclear aromatic hydrocarbons (PAHs) (a subset of SVOCs) were detected in the SB-CDL-01 soil sample collected above the water table. No VOCs were detected in that sample. Fewer SVOCs were detected in a sample from a depth of 9 feet (below the water table). VOCs in the deeper sample include1,2-dochloropropane (2,000 microgram per kilogram [µg/kg]), ethylbenzene 12,000 µg/kg), m-and/or p-xylene at 9,600 µg/kg, and tetrachloroethene (PCE) at 1,100 µg/kg.
- The groundwater sample from SB-CDL-01 (identified as sample HP-CDL-01) contained several VOCs, including relatively low levels of chlorinated solvents (1.1 micrograms per liter [µg/l] of trichloroethylene [TCE], 0.7 µg/l chloromethane, 12 µg/l cis-1,2-dichloroethene (DCE), and 12 µg/l of PCE) and higher concentrations of petroleum hydrocarbons (920 µg/l ethylbenzene, 3,700 µg/l m-and p-xylenes, and 12,000 µg/l toluene). Concentrations of PCE and xylenes exceeded risk-based criteria.
- Concentrations of metals in SB-CDL-02 and SB-CDL-03 were higher than in SB-CDL-01. Soil from all three borings contained concentrations of arsenic that exceeded soil screening criteria. Groundwater from SB-CDL-01contained concentrations of iron and manganese that exceeded the U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs).

#### 2.2.2.2 Forensic Soil Investigation – 2004

In 2004, USACE collected a single soil sample from the contaminated soil layer found at approximately 7.5 feet in boring SB-CDL-01. The sample was analyzed for volatile petroleum hydrocarbons and extractable hydrocarbons using the Massachusetts Department of Environmental Protection (MADEP) method and EPA Method 8015 gas chromatograph fingerprinting analysis. The chromatograph produced by the analysis appeared to be weathered JP-5 aviation fuel with a significant number of the lower boiling point hydrocarbons missing. The results of the MADEP method also suggest that the contamination is a distillate fuel.

#### 2.2.2.3 Soil Gas Investigation – 2004

In 2004, soil gas samples were collected via a passive soil gas survey (Gore-Sorber® technique) conducted across the Site and including all or part of each AOC. The survey measured elevated levels of benzene, toluene, ethylbenzene, and xylene (BTEX) as well as chlorinated solvents (defined in the survey as PCE, TCE and dichloroethylene [DCE]). BTEX

compounds were found in heaviest concentrations east of the southern end of the Central AOC and, to a lesser degree, in the northeast part of the Central AOC, the northern end of the Western AOC and the southern end of the Southern AOC. Chlorinated solvents were detected in soil gas in the northeastern end of the Southern AOC and the southeastern end of the Central AOC.

#### 2.2.2.4 Background Soil and Groundwater Investigation – 2004

NASA completed a background soil and groundwater investigation in 2004 (Tetra Tech 2004) (the Background Study) to provide data sets that evaluate the background conditions (concentrations of analytes) in soil and groundwater at the Main Base. The data used in the study included samples collected in prior studies and samples collected specifically for the Background Study. Only samples that were located away from and/or upgradient of suspected contaminant source areas were used in the study.

Data from the two types of soils found at the Main Base—Molena and Bojac Series—were evaluated and found to be statistically distinct from each other. Background concentrations were evaluated for each soil type. The Molena soils are found on the Project 15 CDL. The constituent concentrations in surface and subsurface soil within each series were also found to be statistically distinct.

Groundwater samples were collected from only the shallowest water-bearing zone, the surficial aquifer. The Background Study also found that groundwater samples collected via low-flow sampling techniques provide a better representation of groundwater conditions.

#### 2.2.2.5 Remedial Investigation – 2007

An RI was conducted in 2007, and the data were used for a baseline HHRA and ERA. The RI, HHRA, and ERA results were reported in the final remedial investigation report (Versar 2013). The results of the RI and risk assessment were used to develop a draft FS (Versar 2012).

Remedial investigation activities included:

- Conducting electromagnetic and ground penetrating radar geophysical surveys to find buried metal and non-metal debris.
- Conducting a membrane interface probe (MIP) survey. The MIP is a direct push instrument that contains photoionization, flame ionization, and electron capture detectors. VOCs in soil will migrate through the probe membrane and are analyzed by the detectors.
- Excavating, logging, and soil sampling of 10 test pits. At least two soil samples (a surface soil from 0 to 6 inches bgs and a subsurface sample from 6 to 24 inches bgs) were collected from each test pit and analyzed for target compound list (TCL) VOCs, SVOC, pesticides and TAL metals. Ten test pits (TP1 through TP10) were excavated: two test pits were excavated in each of the Northern, Western and Central AOCs, and four test pits were excavated in the Southern AOC. At a minimum, soil samples from 0 to 0.5 and 0.5 to 2.0 feet bgs were collected for risk assessment purposes. Additional samples were collected if waste was encountered.
- Installing and sampling six shallow monitoring wells to depths about 7 feet below the water table. Soil samples were collected from the boring during drilling. One monitoring

well, MW-1, was installed upgradient of the AOCs and served as a location for background data. MW-6 and MW-2 were installed downgradient of the Northern and Western AOCs, respectively, where no evidence of debris was found during the test pit investigations. MW-5 and MW-4 were installed downgradient of the Central AOC, and, as mentioned previously, MW-3 was installed downgradient of the Southern AOC. Two rounds of groundwater samples were collected and analyzed for TCL VOCs, SVOCs, and TAL metals.

- Collecting 10 sediment samples and analyzing them for TCL VOCs, SVOCs, pesticides, and TAL metals, and total organic carbon.
- Collecting 10 surface water samples and analyzing them for TCL VOCs, SVOCs, and TAL metals.
- Measuring water levels, hydraulic gradients, and hydraulic conductivity of the shallow surficial aquifer.

Significant findings of the RI are summarized here; full evaluation of data collected in the RI is provided in the final RI report (Versar 2013).

- The geophysical investigation identified five anomalies located in either the Central or Southern AOCs. Geophysical investigation anomalies are locations where conductivity readings are either above or below zero millimhols per meter and/or magnetic susceptibility readings are either above or below zero ppt. Four of the five anomalies (Anomalies A through D) were located along the eastern edges of the AOCs; near the edge of the marsh. The fifth anomaly (Anomaly E) was located in the northwest part of the Central AOC.
- Elevated detector values were found in one of the eight MIP borings, MIP-5, located in the north-central part of the Central AOC. When the MIP probe was pulled from the ground, the probe drill rods were covered in gray paint.
- No waste was encountered in the test pits located in the Northern or Western AOCs.
- Surface soil (0 to 0.5 feet bgs) from the Northern AOC did not contain any organic compounds; only bis(2-ethylhexyl)phthalate (BEHP), at a concentration below site background levels, was detected in subsurface soils. Concentrations of detected metals did not exceed site background levels.
- The only organic compound detected in shallow soil (0 to 0.5 feet bgs) from the Western AOC was the pesticide, 4,4-dichlorodiphenyldichloroethylene (4,4-DDE). The concentration is less than the mean concentration of DDE found in site background soil samples.
- Waste drums were found at depths up to 13 feet in a test pit located near MIP-5 in the Central AOC. Waste was also found at the surface over the eastern third of the Central AOC.
- Waste (cinders and burned debris) was encountered at the surface and at depths up to 8 feet in the Southern AOC.
- During drilling of the monitoring wells, petroleum staining was noted in SB-4 (completed as MW-4), located on the southeastern edge of the Central AOC. Staining

was found in this boring from about 9 feet to about 14 feet, decreasing with depth. Monitoring well MW-3, located within the Southern AOC, is screened within waste material.

Results of the groundwater sampling included:

- VOCs, including chlorinated solvents (PCE, TCE, cis-1,2-dichloroethene [cis-1,2-DCE], and 1,2-dichloroethene), aromatic hydrocarbons (ethylbenzene, toluene, and xylenes), and ispropylbenzene were found downgradient of the waste material in the Central AOC (in MW-4). Two SVOCs, naphthalene and 2-methylnapthalene, were also detected in MW-4. Concentrations of several of these contaminants exceeded the EPA RSLs for tap water. Concentrations of three contaminants (toluene, PCE, and 1,2-dichloroethene) also exceeded EPA drinking water Maximum Contaminant Levels (MCLs).
- Iron, manganese, and mercury were detected in groundwater from monitoring wells at concentrations exceeding the EPA RSLs. Mercury concentrations were highest in the background well (MW-1); mercury was found in the method blank associated with all groundwater analyses.

Results of the surface water and sediment sampling included:

- In surface water, concentrations of aluminum, antimony, arsenic, copper, chromium, magnesium, manganese, mercury, selenium, vanadium, and sodium in surface water exceeded background concentrations; however, only mercury and copper concentrations exceeded the EPA Biological Technical Assistance Group (BTAG) screening values. Low levels of VOCs (benzene and carbon disulfide) and SVOCs (naphthalene and 2-methyl naphthalene) were also detected.
- VOCs (acetone, 2-butanone, carbon disulfide, cyclohexane and methylene chloride) and pesticides (4,4-dichlorodiphenyldichloroethane [4,4-DDD] and 4,4-DDE) were found in sediment samples. Two SVOCs (di-n-octylphthalate) and BEHP were also detected. Concentrations of BEHP, 4,4-DDD and 4,4-DDE, and several metals (arsenic, copper, lead, mercury, nickel, silver, and zinc) exceeded BTAG screening values.

The results of the RI hydrogeologic investigations are included in the discussion of site hydrogeology in Section 2.3.3.

## 2.3 Regional and Site Physical Characteristics

Site soils have been classified as Molena loamy sand. Molena loamy sand is characterized by 0 to 6 percent slopes, with rapid permeability and is somewhat excessively drained. The background study (Tetra Tech 2004) found that Molena loamy sand had concentrations of naturally occurring metals that are statistically distinct from concentrations of these metals in the other soil type found on Wallops Island Main Base, the Bojac soils. Therefore, the concentrations of metals in soil will be evaluated with respect to the concentration of metals in the Molena loamy sand.

### 2.3.1 Site Topography and Drainage

Elevations on the WFF range from mean seal level to 42 feet amsl, with slopes of 1 to 2 percent (Versar 2013). Ground elevations in the CDL, were measured at the SFI sampling locations shown on the map referenced in Section 3 of this report. In general, the land surface at the CDL slopes from north to south and west to east. Elevations ranged from just over 1-foot amsl on the southeastern edge of the Southern AOC to just under 21 feet amsl west of the access road, across from the Central AOC. In the northern portion of the CDL, elevations decrease from about 19 feet west of the access road in the Northern AOC to about 10 feet, near the edge of the marsh east of the Northern AOC. In the southern part of the Site, elevations just west of the access road are about 12 to 13 feet amsl; near the edge of the marsh, elevations are 3 to 4 feet amsl.

The Site is bound on the east by a narrow tidal channel of Mosquito Creek; water flows north to south in the immediate vicinity of the CDL. The tidal channel turns eastward south of the Site and rejoins Mosquito Creek.

Drainage on and adjacent to the CDL is controlled by ditches on the west side of the access road as well as two concrete culverts that connect the drainage ditch to west-to-east drainage features: one located north of the Central AOC and the other located south of the Southern AOC. Another, smaller man-made drainage ditch receives surface water flow off the Southern AOC **(Figure 2-2).**

### 2.3.2 Regional and Site Geology

#### 2.3.2.1 Regional Geology

The regional geologic framework, particularly the stratigraphy and hydrostratigraphy, used in this investigation is consistent with information presented in USGS Scientific Investigations Report 2009-5066, *Simulation of Groundwater-Level and Salinity Changes in the Eastern Shore, Virginia* (2009). Previous investigations of the Project 15 CDL used different terminology to describe the shallow stratigraphy. Previously the Pleistocene deposits were attributed to the Columbia Group, and the shallowest water-bearing unit was designated as the “Columbia Aquifer.” In the SFI, these deposits are referred to as the Pleistocene deposits, and the uppermost (unconfined) aquifer is referred to as the “surficial” aquifer.

WFF is located in the Atlantic Coastal Plain Physiographic Province, a seaward sloping stratified body of sediments bounded on the west by the Atlantic Seaboard Fall Line and on the east by the Atlantic Ocean. On the Eastern Shore of Virginia, these sediments thicken and dip toward the northeast. The facility is underlain by approximately 7,000 feet of unconsolidated sediments dating back to the Cretaceous Period. Below this group of sediments are crystalline basement rocks of igneous and metamorphic origins that also dip to the northeast (USGS 2009). Above the Cretaceous-age formations are the Miocene-age Calvert and St. Marys Formations that together average about 1,000 feet thick on the Eastern Shore. The overlying Yorktown Formation is a sequence of interbedded clays and sands of Pliocene age. The Yorktown Formation thickens to the east and would be expected to be close to 300 feet thick near the Project 15 CDL. Sands of the Yorktown Formation can be distinctively shelly and bluish gray to greenish gray in color.

During the sea level changes of the Pleistocene, drainage channels eroded the top of the Yorktown. Although these now in-filled paleochannels can be significant, there are no known paleochannels in the area of the Project 15 CDL. Generally, on the Eastern Shore, these Quaternary-age sediments are 40 to 150 feet thick and consist of sand, silt, and clay deposited in marginal marine and estuarine environments. Holocene deposits (back bay, salt marsh, and barrier island deposits) are found on the edges of the Eastern Shore (including Wallops Island).

#### 2.3.2.2 Site Geology

The site geology is defined based on information collected during the RI completed by Versar (2013) as well as the boring logs completed during the SFI. Generalized stratigraphy and hydrostratigraphy for the Site is presented on **Figure 2-3**. From the surface downward, the materials present at the Site and investigated during the RI and SFI include fill (including waste); Pleistocene-age sands, silts, and clays; and the Yorktown Formation.

Fill and Waste

Fill is present in the Central and Southern AOCs and consists of both natural materials (predominantly sand) and man-made materials disposed of in the AOCs (waste). Natural material (sand) appears to have been used to grade the topography as well as to cover disposed waste material. The extent of the man-made fill is described in more detail in Section 4 of this SFI report, but a typical distribution of waste is shown in Cross-Section A-A' **(Figure 2-4**). Note that on the cross section, the unit labeled "Fill" is natural material placed above the disposed waste and/or placed and graded. The eastern extent of the waste is the western edge of the marsh in the Central AOC and the Southern AOC.

Within the Central AOC waste is found at the surface but is also buried beneath as much as 11 feet of sand fill. The waste includes empty metal drums, paint, scrap metal, rebar, glass bottles, bricks, cable, springs, tires, and broken concrete. During the SFI, waste was found at depths of up to 12 feet bgs; during the RI the maximum depth of waste in the Central AOC was about 13 feet bgs.

As at the Central AOC, waste in the Southern AOC is found both at the surface and buried beneath a layer of sand fill (up to 4 feet deep). Waste in the Southern AOC consists of cinders and burned rubbish (glass, cans, wires) (Versar 2013) as well as plastic, plates, scrap metal, bathroom fixtures, railroad ties, and metal pipes. The maximum thickness of cover material (fill) was 4 feet of fine silty sand, but in most locations, only about 1 foot of cover sand was present. The maximum thickness of waste found during the SFI was 5 feet.

Pleistocene Deposits

Deep temporary wells were constructed during the SFI to sample the lower part of the surficial aquifer (see Section 3.2). The borings for these wells terminated at the top of the Yorktown Formation clay. Based on the logs from these four borings, the Pleistocene deposits are as much as 68 feet thick at the Site. The unit consists predominantly of fine to coarse quartz sands, coarsening downward and containing trace gravel in the lower part of the unit. Sands and minor organic clay layers consistent with the sandy estuarine and beach deposits are found in the upper part of the Pleistocene deposits near the marsh.

In the southern part of the Project 15 CDL site, a significant clay unit—the Columbia Clay—is found within the Pleistocene deposits. At the Town of Chincoteague supply well TOC-06 (see the well log in the RI report attachments [Versar 2013]), this orange-brown and gray clay is present from 21 to 42 feet bgs. At DTW-4, located 140 feet east-northeast of TOC-06, the olive grey clay and silt are present from 24.6 to 39.6 feet bgs. As shown on north-south oriented Cross Section B-B' (**Figure 2-5**) this clay does not extend to the northern part of the Site.

Yorktown Formation

The Yorktown Formation clays and sands underlie the Pleistocene deposits. The top of the Yorktown Formation is a clay, distinguished by a distinctive greenish color, present at a depth of about 60 to 68 feet; the Yorktown clay was found in each of the deep temporary borings drilled in the SFI. The deep borings completed during SFI did not penetrate more than approximately 5 feet into the Yorktown clay. At TOC-06, the Yorktown clay is 33 feet thick (from 84 to 117 feet bgs). A second clay is found from 127 to 156 feet bgs. The well is screened from 154 to 225 feet bgs in fine to coarse sand, shell, and clay. A third significant clay within the Yorktown formation is found from 228 to 238 feet bgs (the maximum depth of the well boring).

## 2.3.3 Regional and Site Hydrogeology

### 2.3.3.1 Regional Hydrogeology

The two uppermost water-bearing formations within the WFF area are the Pleistocene-age surficial aquifer and the Miocene- and Pliocene-age Yorktown-Eastover Aquifer (Yorktown Aquifer). These two aquifers are the most important water supply formations for agricultural, domestic, public, and industrial uses (NASA 1994).

Surficial Aquifer

The Pleistocene deposits of the surficial aquifer consist of sand, sandy clay, and minor amounts of gravel deposited during sea level fluctuations in the Pleistocene epoch (USGS 2009). Regionally, the surficial aquifer is recharged by surface waters or by infiltration of precipitation.

At WFF, the surficial aquifer is unconfined and typically overlain by beach sands, silts, and gravel. In upland areas, the surficial aquifer occurs between depths of 5 and 60 feet bgs. Where the Columbia Clay is found, the water in the surficial aquifer may be partially confined. In marshy areas, such as those found on the eastern fringe of the Project 15 CDL site, the water table is near the land surface where the high marsh transitions to upland. Groundwater flow is generally northeast toward the marsh area that separates Chincoteague Island from the mainland (NASA 1994).

Yorktown Aquifer

On Virginia's Eastern Shore, the upper aquitard of the Yorktown Formation is comprised of a thick series of coalescing layers consisting of fine to coarse, greenish gray, glauconitic quartz sand, which is clayey, silty, and in part, contains shell fragments. The formation occurs at depths of 60 to 140 feet in Accomack County (NASA 1994), is at least 63 feet thick at WFF, and reaches its maximum thickness of 109 feet across the bay in Chincoteague (Meng and Harsh 1988).

The conceptual model of groundwater flow indicates that the Yorktown Aquifer is recharged through the upper Yorktown aquitard in the Eastern Shore. Groundwater in the Yorktown Aquifer flows laterally from the recharge area and discharges into the Chesapeake Bay or Atlantic Ocean or migrates vertically back upward across the confining unit along the coastal areas. Additionally, water from both aquifers can be withdrawn via wells for water supply (USGS 2009).

The Town of Chincoteague potable water supply well TOC-06 is located within the southern boundary of the CDL and pumps from the Middle Yorktown-Eastover aquifer (Chincoteague, 2010). It is cased to 154 feet depth and screened (draws water) from 154-225 feet depth (Chincoteague, 2010). TOC-06 is separated from the surficial aquifer by two confining units; the Upper Yorktown-Eastover confining unit and the middle Yorktown-Eastover confining unit (USGS, 2009). The zone of influence of well TOC-06 is not provided in the *Town of Chincoteague Water Supply Plan* (Chincoteague, 2010) nor in *Simulation of Groundwater-Level and Salinity Changes in the Eastern Shore, Virginia* (USGS, 2009). However, based on the presence of two confining units, an assumption can be made that the pumping of well TOC-06 will most likely affect deeper groundwater flow but there is minor influence on the flow of groundwater in the surficial aquifer from the pumping of well TOC-06.

Water Supply Aquifers

Generally, potable water supply wells for both the Town of Chincoteague and WFF are screened at the upper portion of the Yorktown aquifers, from depths less than 150 feet bgs (NASA 1994), but Chincoteague also has water supply wells that draw from the surficial aquifer.

#### 2.3.3.2 Site Hydrogeology

At the Project 15 CDL site, the surficial aquifer is approximately 50 feet thick (water table to top of Yorktown Clay). As shown on boring logs from the RI, the aquifer consists of very fine to very coarse-grained sand and silty sand at the CDL site (Versar 2013). As mentioned in Section 2.3.2.2, a discontinuous clay is found within the surficial aquifer of the southern part of the Site.

Locally, studies conducted in correlative environmental settings elsewhere on the Main Base (Versar 2001a, 2001b) indicated that tidal fluctuations occur in on-site monitoring wells, but these fluctuations do not materially affect groundwater flow direction (Versar 2013). Additionally, aquifer tests estimated hydraulic conductivity values ranging from approximately 80 to 200 feet per day and specific yield values from 0.01 to 0.13 for the unconfined aquifer. These values are typical of unconfined aquifers with mainly sand units and demonstrate the ease of recharge from surface water and/or precipitation (Versar 2013). Contrary to the regional evaluations, the local tests also indicate there is no significant hydraulic connection through the aquitard below the unconfined aquifer. Aquifer tests performed on the upper and middle Yorktown aquifers estimated a transmissivity range of 8,500 to 14,500 gallons per day per foot (gpd/ft), a storativity of approximately 0.003, and a vertical leakage rate of 0.0352 feet per day for the upper aquifer. Aquifer tests conducted at WFF demonstrate there is no significant vertical leakage through the aquitard below the unconfined surficial aquifer (Metcalf & Eddy 1992) though these tests were not conducted in the immediate vicinity of the Town of Chincoteague's water supply well TOC-06.

At the Project 15 CDL site, the Yorktown Aquifer is separated from the overlying surficial aquifer by a 63-foot thick confining layer (aquitard) of clay and silt as was detailed in the geologic log for the Town of Chincoteague water supply well TOC-06. The top of the shallowest confined aquifer of the Yorktown Formation at WFF is found at depths of approximately 100 feet bgs. Note that well TOC-06 is located within the site boundary.

Two rounds of water level monitoring at the six site monitoring wells were conducted immediately prior to each groundwater sampling event**.** The water levels recorded during these sampling events are shown in **Table 2-1. Figure 2-6** is a water level contour map for the shallow surficial aquifer drawn based on data collected during the May 2016 event. Water levels collected in November 2016 are similar although the water levels in all wells, except MW-5, are higher than those measured in May 2016. In comparing May 2007 and November 2007 water level data (Table 2-1), water levels measured in May were higher, except for those at MW-3. The RI concluded that the clay and stiff silt found at the bottom of the waste encountered in MW-3 may be locally perching the groundwater. At MW-3, this results in water collecting in the permeable waste and is unable to drain easily through the fine-grained materials. However, the water levels that do not appear to conform to a trend (such as seen in MW-5 in 2016 and MW-3 in 2007) may be the result of local response to tides, which would be expected to impact water levels in wells located closer to the marsh more strongly than those that are farther from the marsh (e.g., MW-1 and MW-2). As noted in the Field Sampling and Analysis Plan (Versar, 2007), data from the Waste Oil Dump at WFF (Site 16) which is located in a similar geologic setting at the northern end of Runway 17-35, demonstrated that tidal effects are not significant in this setting.

As shown on **Figure 2-6** groundwater flow is toward the northeast. Based on the water levels observed in May 2016, the horizontal hydraulic gradient at the CDL is about 0.15 foot per foot.

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# 3. Supplemental Field Investigation

The SFI consisted of several events conducted between May 2015 and November 2017. Field activities included trenching, collecting soil samples from trenches and from DPT borings, sampling shallow and deep temporary wells, collecting two rounds of surficial aquifer groundwater samples from monitoring wells, collecting a Yorktown Aquifer groundwater sample from water supply well TOC-06, and collecting pore water and sediment samples from Little Mosquito Creek. The trenching and temporary well activities were phased to allow evaluation of preliminary analytical results and field observations to inform the locations of subsequent data collection.

The date of sample collection events, the samples collected, and the data gaps identified, if any, are listed on **Table 3-1**. Data gaps were filled with subsequent data collection.

The location of all the trenches and temporary monitoring wells (shallow and deep) are shown on **Figure 3-1.** Note that **Figure 3-1** also shows the location of test pits excavated during the RI. The location of SFI sediment and pore water sampling locations are shown on **Figure 3-2.** Locations of RI sediment sampling are also shown on **Figure 3-2**. The objectives and rationale of the investigation activities are described below. The procedures used to collect samples and perform other fieldwork are described in the *Feasibility Study Work Plan, Construction Debris Landfill, Wallops Flight Facility Formerly Used Defense Site* (CDM Smith 2015) (the Work Plan) (including the field sampling plan [FSP] and quality assurance project plan [QAPP]), the *Field Sampling Plan Addendum #1, Construction Debris Landfill, Feasibility Study, Wallops Island Flight Facility Formerly Used Defense Site* (CDM Smith 2016) (Field Sampling Plan Addendum #1), and the *Work Plan Addendum #2, Project 15 Construction Debris Landfill, Wallops Flight Facility* (CDM Smith 2017).

Sample information, including the sample depth, sampling date, and analyses performed on the samples from various media are shown in **Tables 3-2** through **3-5**.

## 3.1 Trenching and Shallow Temporary Wells

Trenching was conducted to identify the most contaminated waste material and delineate the extent of the debris in the Southern and Central AOCs of the Project 15 CDL. Soil samples were collected from areas of highest contamination (as determined by elevated photoionization detector (PID) readings, staining, other visual evidence, and direction from the USACE technical lead). For logging purposes, each trench was divided into three 10-foot-long sections designated A, B, or C. All trench logs are compiled in **Appendix A**. Soil samples were collected from 10 trenches (in two cases, two samples were collected from different segments of the same trench) and analyzed for TCL VOCs, TCL SVOCs, and TAL metals. In addition, when ash was encountered, samples (TP-20B-00-010 and TP-27-00-004 and their duplicates) were collected and analyzed for dioxins/furans. **Table 3-2** lists the soil samples collected from all trenches.

Soil samples were also collected from the initial 11 DPT borings; sample identifiers for these soil samples include the identifier “DPS.” Soil sampling information is shown on **Table 3-2**. Shallow temporary wells were installed in these borings as well as nine subsequently drilled borings. All temporary wells were abandoned immediately following sampling. Groundwater

samples from shallow temporary wells include the identifier “DPW;” sampling information for the groundwater samples from temporary wells is shown in **Table 3-3**.

### 3.1.1 May and June 2015 Event – Trenching

Initially, thirteen 30-foot-long trenches were installed at locations TP-11 through TP-23 (see **Figure 3-1**). Note that 10 test pits, TP-1 through TP-10 on **Figure 3-1**, were excavated during the RI (Versar 2013). During the SFI, the USACE Technical Lead added a fourteenth trench, TP-24. The rationale for selecting the initial and additional trench locations include:

- TP-11: North of TP-1 to identify the transition from the waste found in TP-1 to non-waste.
- TP-12: East of TP-1 to determine the lateral extent of waste toward the margin of the marsh.
- TP-13: Southeast of TP-1 to identify the transition from waste to non-waste between TP-1 and TP-6 (both excavated in the RI), near the margin of the marsh.
- TP-14: Midway between TP-1 and TP-6 to determine the southern extent of waste.
- TP-15: East of TP-6 to determine the eastern extent of waste in the petroleum-impacted soil area.
- TP-16: Between TP-3 (waste) and TP-2 (no waste) (both excavated during the RI) to identify the transition from waste to non-waste.
- TP-17: Southwest of TP-3 to determine the extent of TP-3 waste toward the road.
- TP-18: East of TP-3 to determine the extent of waste toward the marsh.
- TP-19: Between TP-3 and TP-7 (excavated during the RI), southeast of TP-3, to determine the eastern extent of waste.
- TP-20: South of TP-7 to identify possible area of non-waste to the east.
- TP-21: South of TP-4 (excavated during the RI) and TP-7 to identify the transition between waste and non-waste.
- TP-22: South of TP-21 to determine the southern extent of waste when waste was encountered in TP-21 (per the approved FSP, the selection of this location was a USACE field decision).
- TP-23: In the western portion of the Southern AOC to determine the presence or absence of waste on the west side of the service road.
- TP-24: Extended TP-11 to the west to define the westward extent of waste found in TP-11 (per the approved FSP, the selection of this location was a USACE field decision).

Ash encountered in TP-20 was sampled and analyzed for dioxin/furans.

The preliminary laboratory analytical data and observations were used to finalize locations for the first round of shallow temporary wells (see Section 3.1.2).

### 3.1.2 July 2015 Event – Shallow Temporary Wells

Eight planned shallow borings (DPT-1 through DPT-8) were located to collect soil and groundwater samples near or downgradient of, the most contaminated material encountered in the trench soil samples. Based on information collected in the May and June 2015 trench investigation, three additional borings (DPT-9 through DPT-11) were added to the investigation. In addition, the location of two originally planned borings, DPT-3 and DPT-6, were revised from those shown in the approved FSP to be closer to waste material (based on trench observations). The locations DPT-1 through DPT-11 are shown on **Figure 3-2**. Soil and groundwater samples were collected from borings DPT-1 through DPT-8. Only groundwater samples were collected from DPT-9 through DPT-11 As mentioned previously, soil samples from shallow DPT borings have the identifier DPS, and groundwater samples have a DPW identifier.

The rationale for the DPT boring locations sampled in July 2015 is as follows:

- DPT-1: Cross-gradient (northwest) and slightly upgradient of MW-5 to assess the lateral extent of groundwater contamination emanating from the area of test pit TP-1 that may not have been intercepted by MW-5.
- DPT-2: Downgradient of TP-1 and south of MW-5 to assess the impact of waste in TP-1 on the lateral extent of groundwater contamination. Groundwater contouring indicates that MW-5 may be located too far north to best monitor any groundwater contamination contributed by the source material around TP-1.
- DPT-3: Adjacent to the center of the west edge of trench TP-13 to be close to the location of the sample (TP-13B) that contained elevated concentrations of 1,1,2-trichloroethane (TCA).
- DPT-4: Downgradient of TP-8 to detect any groundwater contamination sourced to the moderate hit on the electron capture detector recorded at TP-8 (MIP-1) at 25 to 30 feet bgs. DPT-4 is also adjacent to the location of RI TP-4 where waste was noted.
- DPT-5: Upgradient of the waste found in TP-11 and TP-24.
- DPT-6: Adjacent to the center of the edge of TP-18 where elevated concentrations of lead were detected in the trench soil sample.
- DPT-7: Downgradient of TP-22 to evaluate any groundwater impacts from waste found on the east side of the Southern AOC.
- DPT-8: Downgradient of TP-7 to assess impacts from waste in TP-4 and TP-7 on groundwater. Adjacent to TP-20 where burned waste was found.
- DPT-9: Within the Northern AOC, west of the access road to look for potential contaminant sources.
- DPT-10: North of the Central AOC to delineate the northern extent of the groundwater contamination found in trenches in the northern part of the Central AOC.
- DPT-11: Located between the waste found in the Southern AOC and the Town of Chincoteague well TOC-6 to see if contaminants found in groundwater in the Southern AOC are present west of the access road.

All logs of DPT borings are compiled in **Appendix A**.

### 3.1.3 May 2016 Event – Trenches and Shallow Temporary Wells

In May 2016, second phases of trenching and shallow borings were performed to further delineate the waste and groundwater contamination. Locations for three trenches (TP-25 through TP-27) and six shallow temporary wells (DPT-12 through DPT-17) were selected by USACE based on information collected in the prior SFI field events. Soil samples from the trenches were analyzed for VOCs, SVOCs, and metals. One soil sample, from TP-27, was analyzed for dioxins/furans. Groundwater samples were analyzed for VOCs, SVOCs, and metals; groundwater from DPT-15, DPT-16, and DPT-17, all located near the Southern AOC, were also analyzed for dioxins/furans.

The rationale for each trench and temporary well is listed below:

- DPT-12: northwest of (upgradient of) the contamination found in TP-11 and TP-24
- DPT-13: west (upgradient) of the stained soil and waste found in TP-11 and TP-24; west of the access road
- DPT-14: west side of the access road and upgradient of waste found in the Central AOC to delineate extent of impacted groundwater
- DPT-15: upgradient of TOC-06 to characterize groundwater in the surficial aquifer flowing toward the water supply well
- DPT-16: between ash in southern AOC and TOC-6 to characterize shallow surficial aquifer groundwater
- DPT-17: south of the Southern AOC to delineate the southern extent of waste-impacted groundwater
- TP-25: adjacent to DPT-13 to look for the source of contamination (stained soil and sheen) found in DPT-13
- TP-26: north of waste found in TP-11 to delineate the northern extent of waste in the Central AOC
- TP-27: south of TP-22 to delineate the extent of waste found in TP-22

Well construction logs for all temporary wells are compiled in **Appendix B.**

## 3.2 Deep Temporary Wells

Four deep temporary wells were installed with screens in the bottom of the surficial aquifer, i.e., just above the top of the Yorktown clay. The deep temporary wells were installed as described in the approved FSP and Work Plan Addendum #1 (CDM Smith 2016). The DPT drilling rig used for the effort was capable of retrieving continuous soil samples and placing temporary casing into the Columbia clay via a dual tube sampling system if the clay was encountered.

The objective of the deep temporary wells was to characterize deep surficial aquifer groundwater in areas where the soil and shallow surficial aquifer groundwater was thought to be most contaminated. The locations for these borings were selected based on preliminary (not validated) soil and groundwater data from the trenches and borings sampled in the earlier

sampling events. Per discussions with the stakeholders, the planned location of DTW-4 was not based on areas of heaviest contamination; instead, the location was selected to be between water supply well TOC-06 and the closest AOC. The rationale for each location is as follows:

- DTW-1: adjacent to TP-26 where the highest concentrations PAHs were found in soil
- DTW-2: near DPT-2 where elevated concentrations of benzene (2,100 µg/l in water) were found and about 30 feet north of TP-13 where the highest concentrations of VOCs were found in soil
- DTW-3: adjacent to TP-20 where dioxin congeners were detected in soil and MW-3 where the highest dioxin concentrations were found in shallow surficial aquifer groundwater during the May 2016 monitoring well sampling
- DTW-4: between the Southern AOC and the TOC-06 water supply well

Sampling information for groundwater samples collected from deep temporary wells is shown on **Table 3-3**. Note that the identifier “DTW” is used for groundwater samples from the deep temporary wells.

## 3.3 Monitoring and Water Supply Well Sampling

Existing monitoring wells, MW-1 through MW-6, were sampled in May 2016 and November 2016 per the procedures described in the approved FSP (CDM Smith 2015). All monitoring wells were sampled for VOCS, SVOCs, and metals. During the May 2016 sampling event, samples from MW-3, MW-4, and MW-5 were also analyzed for dioxins/furans. In November 2016, samples from all monitoring wells, except MW-6, were analyzed for dioxins/furans.

TOC-06 was sampled from an existing tap at the wellhead per procedures in Work Plan Addendum #2 (CDM Smith 2017). Samples collected in November 2016 from TOC-6 were analyzed for VOCs and dioxins/furans. In November 2017, additional samples were collected from this well and analyzed for SVOCs and metals.

Sampling information for monitoring well groundwater samples (“MW” identifier) and drinking water supply well samples (“TOC” identifier) are shown on **Table 3-3**.

## 3.4 Pore water and Sediment Sampling

Pore water and sediment sampling of the marsh adjacent to the CDL was added to the SFI to supplement the sediment analytical data obtained during the RI (Versar 2013). During the RI, sediment was not analyzed for dioxin; when dioxin and furan congeners were detected in earlier phases of the SFI, the lack of data in adjacent site sediments presented a data gap. Contaminants from the Site may migrate to the sediment via runoff and tidal action, and shallow groundwater likely discharges to the marsh. Therefore, analytes associated with the waste in the CDL (VOCs, SVOCs, and metals) were considered to be potentially present in the sediment and pore water.

In August 2016, 13 sediment samples and 13 pore water samples, co-located with the sediment samples, were collected and analyzed for VOCs, SVOCs, metals, and dioxins/furans. Sediment and pore water samples were collected during the SFI from locations SD/PW-11 through SD/PW-21 shown on **Figure 3-2**. Sediment samples collected from

locations SD-1 though SD-10 (also shown on **Figure 3-2**) were collected during the RI (Versar 2013). Water in the creek is tidally influenced but flows north to south past the Site. Locations SD/PW-12, SD/PW-20, and SD/PW-11 were selected as background locations.

Sediment and pore water samples were collected per procedures in the approved Work Plan Addendum #1 (CDM Smith 2016). Sediment samples were collected from a depth of 0 to 6 inches with a stainless-steel spoon. Pore water was collected using the stainless steel MHE Products PushPoint™ sampler. At each pore water sample location, the tip of the push point sampler was pushed to a depth of 1 foot into the sediment. Water was purged and sampled with a peristaltic pump.

Pore water sampling information is shown on **Table 3-4**, and sediment sample information is shown on **Table 3-5**. The identifiers for pore water and sediment are “PW” and “SD,” respectively.

# 4. Analytical Results and Distribution of Contamination

The objectives of the SFI included identifying the depth of groundwater contamination and delineating the extent of waste in the CDL. The analytical data presented in Section 4.2 are used to assess risk in the HHRA and ERA addenda and to inform the development of the CSM. To characterize the contamination, soil samples and initial temporary well groundwater samples were collected from material suspected to be the most contaminated based on field observations (e.g., visual and PID evidence).

All groundwater and soil chemical data were used, along with available geologic data and observations from test pits and borings, to develop a three-dimensional (3-D) model of contamination at the Site. This model was used to estimate the extent of waste material, stained soil, and groundwater contamination as described in Section 4.1.

## 4.1 Waste and Stained Soil Delineation

Delineation of waste material is a primary objective of the SFI. Field observations documented on trench and boring logs (**Appendix A**) and the boring logs in the RI (Versar 2013) noted both waste material (man-made material and objects) and zones of dark-stained soil. In the field, the stained soil can be identified as a dark-stained native material at or near the water table (in most places where it was observed), with elevated PID readings. Both the waste and stained soil are considered to be indicative of potential sources of contamination to site media (soil, groundwater, sediment, surface water, and pore water).

The presence and thickness of the waste, and the intervals of stained soil, were inputs to the Leapfrog® 3-D model, which was used to depict wastes and calculate the volume of waste for use in the FS. The 3-D model incorporates geologic, hydrogeologic, and chemical analytical data to describe the materials and contamination in three-dimensional space. Additionally, model outputs were adjusted based on the USACE project team's knowledge of the Site. The stakeholders providing the project team knowledge of the site include NASA, EPA, VDEQ, and USACE. The model is not a contaminant transport model or groundwater flow model; rather, the model uses a form of Kriging to extrapolate the data from known locations to areas where data were not collected. The model has been used to develop cross sections and other figures presented in this section.

The lateral boundary of the waste and stained soil, as extrapolated by the model and projected to land surface, is shown on **Figure 4-1**. Note that the model extrapolates waste material at depths lower than some sampling points; therefore, waste may not have been found in some test pits, trenches, or borings that on **Figure 4-1** appear to have waste. A more detailed description of field observations used to delineate the extent of waste and stained soil is provided below.

### 4.1.1 Central AOC Waste and Stained Soil

As shown on **Figure 4-1**, the boundaries of waste material in the Central AOC were investigated with SFI trenches TP-11, TP-12, TP-13, TP-14, TP-15, TP-24, TP-25, and TP-26.

Trench TP-25 (17- to 18-ft. deep by 30-ft. long), located west of the access road, was excavated to depths of 17 to 18 feet; groundwater was encountered at about 17 feet. Only

clean fill (to a depth of 0.5 feet) and native soils were found in TP-25. No debris, waste, or stained soil was observed in this trench, and no organic vapors were detected in soil screened with a PID.

The northern boundary of Central AOC waste was investigated with TP-24 (12-ft. deep by 20-ft. long) and TP-26 (14- to 16-ft. deep by 30-ft. long). The boundary of waste was found at the northern 10-foot section of TP-26 (TP-26A), where sand fill was found to a depth of 4 feet. The southern 20 feet of TP-26 contained debris (drums, cable, glass bottles, and tires) from depths of about 4.5 to 8 feet. Water was found at a depth of about 13.5 to 15 feet. Soil above and below the waste and debris in TP-26 was not stained, and no organic vapors were detected in this soil.

Trench TP-11 (12-ft. deep by 30-ft. long), an extension of TP-26 to the south, was free of debris and stained soil in the northernmost 10 feet (immediately south of TP-26), containing only topsoil and ground cover to a depth of 1.5 feet, and native soils below the topsoil. The southern 20 feet of trench TP-11, contained scrap metal, bottles, and other debris from depths of 6 to 8 feet and stained soil with a strong odor at about 12 feet. Slightly elevated PID readings from the stained soil was noted.

Trench TP-24 extended 20 feet west from the southern end of TP-11 (this was the only 20-foot trench). The western 10-foot section contained paint cans and a cream-colored paste-like material from 11 to 12 feet. Soil from about 4 feet to the waste had a strong odor and elevated organic vapor readings. To the east, there was no waste, but stained soil with a strong odor was observed from depths of 6 to 12 feet.

From north to south, trenches TP-12, TP-13, and TP-15 were excavated to define the eastern edge of waste material within the central AOC. The vertical extent of these west-to-east oriented trenches was limited by the western edge of the marsh. In TP-12 (5- to 11-ft. deep by 30-ft. long), waste debris was found from the surface to depths of 8 to 9.5 feet in the western two thirds of the trench. Excavation of the eastern end of the trench was limited by the presence of shallow (5 feet bgs) groundwater; however, waste was found from ground surface to a depth of  5 feet on the edge of the marsh Neither the vertical nor eastern extent of the waste could be observed in TP-12 (i.e., the waste extended into the marsh and could be deeper than 5 feet). The western end of TP-13 (5- to 10-ft. deep by 30-ft. long) was free of debris, but soil from 6 to 10 feet bgs was stained and had elevated PID readings. The eastern 20 feet of TP-13 encountered shallow (5 feet bgs) groundwater and stained soil with elevated PID readings. Debris was found in the eastern end of the trench and observed extending into the marsh. The western 20 feet of TP-15 (5- to 9-ft. deep by 25-ft. long)  was free of debris and stained sand to depths between 5 and 9 feet. The top 1 to 2 feet of TP-15 was topsoil and a concrete-like material was noted at about 1 foot in the center 20-foot section. The easternmost part of the trench contained scrap metals and other debris in the upper 2 feet of soil. No elevated PID readings were noted in TP-15.

Trench TP-14 (12-ft. deep by 30-ft. long) is located in the south-central part of the Central AOC but contained no debris or stained soil to a depth of 12 feet. The top foot of soil in TP-14 was topsoil (fill) and the remaining soils were native. This location helps to define the extent of stained soil and debris to the south in the Central AOC.

### 4.1.2 Southern AOC Waste

As shown on **Figure 4-1**, the boundaries of waste material in the Southern AOC were investigated with SFI trenches TP-16, TP-17, TP-18, TP-19, TP-20, TP-21, TP-22, TP-23, and TP-27.

TP-16 (10- to 11-ft. deep by 30-ft. long), located in the north-central part of the Southern AOC, did not contain any debris or evidence of contamination to a depth of about 11 feet; the top foot was topsoil and ground cover. Similarly, the waste in TP-17 (10- to 12-ft. deep by 30-ft. long), located in the center of the Southern AOC was limited to scrap metal and plastic debris in the eastern two-thirds of the trench at the surface or between 1 to 2 feet bgs. TP-23 (10-ft. deep by 30-ft. long) was located on the western side of the access road and excavated to 10 feet; no waste or other evidence of contamination was found. Material in TP-23 consisted of ground cover and topsoil to a depth of about 1 foot and native soils below the topsoil.

Trenches TP-18, TP-19, TP-20, TP-21, TP-22, and TP-27 were excavated along the southeastern edge of the southern AOC to find the extent of waste along the edge of the marsh. At TP-18 (4.5- to 12-ft. deep by 30-ft. long) and TP-19 (3.5- to 6-ft. deep by 30-ft. long), a foot of top-soil covers debris (e.g., glass bottles, scrap metals, bricks, plates). At TP-18, the waste was generally found at depths between 1 and 6 feet. The depth of the TP-19 excavation was limited to less than 6 feet by shallow groundwater. The southeastern extent of waste was the edge of the marsh. Less than 50 feet south of TP-19, at TP-20 (1.5- to 5.5-ft. deep by 30-ft. long), the waste was slightly deeper (3.5 feet) and consisted of burned material (including charred wood) and an unidentified material with a bluish hue. The southeastern extent of the waste was not identified because shallow water (1.5 feet bgs) prevented deeper excavation. Trenches TP-21 (4- to 4.5-ft. deep by 30-ft. long), TP-22 (2- to 4-ft. deep by 30-ft. long), and TP-27 (3- to 4-ft. deep by 30-ft. long) were excavated in an approximate north-south orientation. All were largely outside of the previously defined boundary of the AOC. Due to the shallow water table, these three trenches could not be excavated beyond 2 to 4.5 feet bgs. The southern 20 feet of TP-22 could only be excavated to 1 to 2 feet due to water. At TP-21, the southernmost end of the trench contained a large amount of glass, wood, and metal debris below the water table (below 4 feet). Only topsoil and native soil (no waste) was found in the 20 southernmost feet of TP-27. In the northernmost section of TP-27, debris, found in a 1- to 2-foot layer below a foot of topsoil consisted of pipes, glass, and bluish-corroded material.

### 4.1.3 Summary of Stained Soil and Waste Delineation

#### 4.1.3.1 Waste

As shown on **Figure 4-1**, waste is present from the northeastern portion of the central AOC to the southeastern portion of the southern AOC and extends to the east of these AOCs. Generally, there are two areas of waste, one in the Central AOC and one in the Southern AOC. Between the Central and Southern AOCs, the continuity of the debris is less certain as the debris in TP-15 was only observed in the easternmost 10 feet of the trench in the top 2 feet (see **Figure 4-2**, Cross Section C-C'). The extent of waste to the east has not been defined but waste is assumed to extend to the edge of the marsh because of the landscape change from a slope to the flat area of the marsh. In many areas where waste is found (see **Figure 4-1**), it is buried under natural fill material. Along the edge of the marsh, debris is

visible at the ground surface. At inland portions of the Central AOC, the debris is buried to depths of up to at least 12 feet (at TP-24) but is shallower along the marsh. In the Southern AOC, the debris is generally shallower with less natural fill cover.

The volume of waste, as calculated by the 3-D model is 7,450 cubic yards.

#### 4.1.3.2 Stained Soil

Two areas of stained soil, both in and around the Central AOC, are present at the CDL (**Figure 4-1**). The northern area of staining appears to originate at TP-24 where staining extends from 4 feet bgs (i.e., several feet above the water table) to about 12 feet bgs. The zone of staining is several feet above the debris found at 11 to 12 feet in that trench, indicating a source other than the debris (see **Figure 4-3**, Cross Section D-D').

The northern lobe of staining extends southwest from TP-24; the top of the stained zone is about the elevation of the water table (Cross Section C-C'). At DPT-14, located along the western edge of the access road, across from the Central AOC wastes, stained soil was observed at depths of about 13 to 20 feet (the ending depth of the boring). The northern edge of the lobe is defined by a relatively thin (1 foot) interval of staining and elevated PID readings at depths of 14 to 15 feet bgs in DPT-5. Similarly, 2 feet of staining were found from 17 to 19 feet bgs at DPT-13 located about 60 feet northwest of DPT 14. No waste was found in the trench (TP-25) co-located with DPT-13. On the east side of the access road, the southern extent of the northern lobe of staining is between TP-1 where about 4.5 feet (from 8.5 to 13 feet bgs) of material with a petroleum odor was noted and TP-14 where no indication of soil contamination was observed. The western and southwestern extents of the northern lobe are not defined. The northern lobe of staining originates at TP-24 and extends to the southwest (upgradient) at a depth which is at or below the water table. Because the staining extends upgradient, either the groundwater gradient was different in the past, tidal influence reverses the groundwater gradient, or there is another source located to the southwest of the plume.

The southern lobe is defined by staining at the water table in trench TP-13 (a depth of 3 to 5 feet), at DPT-3 from 7 to 10 feet bgs (the depth of the boring), and at the water table (about 9 feet bgs) in

MW-4. There is uncertainty in the extent of the lobe to the southwest in particular. The southern lobe is not defined by test pits or soil borings to the west, south, or east.

The volume of stained soil (not intermixed with waste), as calculated by the 3-D model, is 8,065cubic yards.

## 4.2 Analytical Results

The analytical data from samples collected in the SFI are presented in this section. Tables presented in this section are "hits" only tables, i.e., only detected concentrations of analytes are reported. If an analyte was not detected in any sample shown on the table, it is not included in the table. Data flagged during data validation as "Rejected" are not listed in the summary tables. Data qualified as "J" (indicating an estimated value between the analytical detection limit and the quantitation limit) are listed. Full analytical data, including detection limits, are reported in **Appendix C.**

VOC, SVOC, and metals analyses were performed by Shealy Environmental Laboratory, and dioxins/furans analyses were performed by their subcontractor laboratory, Cape Environmental. All analytical work was performed in accordance with the approved QAPP and QAPP addenda (CDM Smith 2015, 2016, and 2017). A data validation subcontractor, Synectics, validated all analytical data; data validation reports are compiled in **Appendix D.**

### 4.2.1 Data Usability

The analytical data set was assessed for usability (in accordance with the Site-Wide QAPP (Weston 2011), Worksheet #37). The assessment involves the quantitative evaluation of the data set against completeness and precision. Both sampling completeness and analytical completeness were evaluated. Sampling completeness for the SFI was 100 percent, i.e., all planned samples were collected. The sampling completeness goal of 95 percent was achieved.

Analytical completeness was calculated as the number of usable (non-rejected) analytical results as a percentage of all possible analytical results. This was calculated for the entire analytical set, by media, and by analyte. The analytical completeness goal for all collected data is 95 percent and for each individual target analyte is 80 percent.

The overall analytical completeness is 99.1 percent; the analytical completeness goal for all collected data was met. The analytical completeness for groundwater from TOC-06 is 100 percent, and the analytical completeness for all other groundwater (monitoring wells and temporary wells) is 99.9 percent. The pore water analytical completeness is also 99.9 percent. Sediment analytical completeness is 99.5 percent, and soil analytical completeness is 97.3 percent.

The analytical completeness for all dioxin and furan congeners and most of the metals is 100 percent. Completeness for antimony is 96.3 percent and for selenium is 98.8 percent. The percent completeness for all other target analytes ranges between 96.3 and 100 percent.

Precision is measured by calculating the relative percent difference (RPD) of duplicate pair analytical results in cases where two results (one in each sample) for the analyte are available. The RPD goals are <20 percent for monitoring well groundwater (and is also used for water supply well TOC-06 because it is a permanent well) and <35 percent RPD for DPT groundwater samples (including both shallow and deep temporary wells). Goals for the pore water are the same as the temporary wells because pore water collection points are not permanent. The RPD goal for soil and sediment is <50 percent The RPD data are summarized by media in **Table 4-1**.

All RPD goals were achieved, except for dioxin/furan results in temporary well groundwater and sediment. Dioxins were detected in two temporary well samples, DPW-8 and DTW-1, and the RPD goal was achieved in DPW-8. Only one dioxin congener, octachorodibenzodioxin (OCDD), was detected in the parent and duplicate samples from DTW-1, and the RPD was 129 percent. The higher value in each duplicate pair will be used for risk assessment and in describing the extent of contamination.

At least one dioxin congener was detected in each of the three sediment duplicate pairs. Higher RPDs are expected in soil and sediment due to the difficulty in homogenizing samples (hence, the higher RPD goal compared to aqueous samples). Higher RPDs can also result

when the analytical results are relatively low. The higher of the values will be used in the risk assessment documents and in describing the extent of contamination.

All duplicate pair analytical data are collected in the tables in **Appendix E**.

The data quality objectives (DQOs) stated in Worksheet #11 of the Site-specific QAPP were based on the need to delineate waste and determine areas of heaviest contamination to plan subsequent sampling. Visual evidence of debris, ash, and stained soil was the DQO for delineation of waste. Preliminary analytical (unvalidated) analytical data were considered sufficient to make decisions because the goal was to identify the areas of highest contamination. The preliminary data were compared against each other and used with other (e.g., PID and visual) data to determine the areas of heaviest contamination. The overall success of the sampling and analytical program, as measured by meeting the completeness and precision goals, contributed to meeting this DQO.

The DQO for geographic data used to delineate the waste was 30 centimeters. The ends of the trenches were surveyed to within 0.1 foot (3.0 centimeters) by a licensed surveyor.

### 4.2.2 Analytical Data Screening Criteria

The analytical data presented in Section 4.2.3 are compared to various criteria to provide context. The screening criteria are similar to the criteria used in the 2013 RI although updated criteria have been used in some cases. For example, the EPA RSLs are routinely updated, and screening levels listed on the May 2018 RSL Summary Tables are used in this report.

Soil analytical data generated in the SFI are screened against the EPA residential and industrial RSLs (EPA 2018) and the site-specific soil background values (Versar 2013). In the screening tables, values exceeding the residential RSLs are bolded, and those exceeding industrial RSLs are in shaded cells. Concentrations exceeding site-specific background are italicized and underlined.

Groundwater data from permanent and temporary monitoring wells were screened against EPA tap water RSLs (exceedances bolded), Wallops Groundwater Background mean concentrations (exceedances italicized and underlined) (Tetra Tech 2004), and the Virginia Groundwater Quality Criteria (VWQC) (Virginia Department of Environmental Quality 2004) (exceedances in shaded cells).

The Town of Chincoteague municipal well (TOC-06) groundwater data, are compared to EPA tap water RSLs, EPA MCLs, EPA secondary MCLs, and VWQC. MCLs are criteria established by EPA for drinking water quality in public water systems under the Safe Drinking Water Act. Secondary MCLs are standards set to control non-health-related characteristics such as color, taste, and odor.

Monitoring well MW-1 is located upgradient of the CDL and therefore considered to be unimpacted by the disposal activities that took place in the Central and Southern AOCs. Compounds detected in MW-1 may be present due to sources of contaminants located upgradient of the CDL. Similarly, well MW-6 is located well north of the Central and Southern AOC and is not likely to be impacted by contaminants in the AOCs. Organic constituents found in groundwater, particularly the monitoring wells, are qualitatively compared to concentrations found in MW-1 and MW-6.

Pore water and sediment analytical data were screened against EPA Region 3 BTAG marine screening levels (exceedances bolded). There are no screening levels specific to pore water; therefore, BTAG aqueous estuarine screening values were used to be conservative.

Organic and inorganic contaminants can be present in the pore water and, particularly, the sediment from sources upstream of the CDL. For this reason, three sediment (SD-11, SD-12, and SD-20) and three pore water samples (PW-11, PW-12, and PW-20) were collected from an area considered to be outside the influence of the CDL. Analyses from these three samples are considered to be representative of "background" conditions. Organic and inorganic compounds detected in pore water and sediment were compared to the range of concentrations found in the background samples (exceedances of the maximum background concentrations were italicized and underlined). Those compounds found at concentrations exceeding the maximum background concentration are considered to be potentially site-related.

### 4.2.3 Dioxin and Furan Analyses

Seventeen congeners of dioxins and furans are reported. Typically, dioxin/furan congener concentrations are reported in a toxicity equivalency quotient (TEQ) that provides a "concentration" value equivalent to the concentration of the most toxic of the congeners (2,3,7,8-tetrachlorodibenzodioxin [2,3,7,8-TCDD]). TEQ is calculated by multiplying the concentrations of each congener by a toxic equivalent factor (TEF) and summing the results.

A TEF for a congener is the ratio of the toxicity of the congener to the toxicity of 2,3,7,8-TCDD. The TEF for 2,3,78-TCDD is 1. The TEQs were reported by the subcontracted laboratory using TEFs derived by the World Health Organization in 2005 (Van der Berg et al. 2006).

In calculation of TEQs, various conventions are used to deal with the situation in which a congener was not detected. The TEQs for non-detected congeners in this report are reported both as TEQ ND=0.5 (a non-detect is given a value of ½ of the detection limit) and TEQ ND=0 (a non-detect is given a value of 0).

### 4.2.4 Analytical Data

The analytical data are presented by media in **Tables 4-2** through **4-10** and discussed by AOC, below. Per the project objectives, the most contaminated soil (as determined by visual or PID evidence) encountered in the trenches was sampled. Shallow temporary wells were paired with heavily contaminated trenches and soil and water samples collected at depths within the saturated zone to determine areas where the upper surficial aquifer was most heavily contaminated.

#### 4.2.4.1 Soil Analytical Data

<u>Central AOC</u>

Soil collected from trenches and shallow temporary well borings from the Central AOC (**Table 4-2**) were analyzed for VOCs, SVOCs, and TAL metals. The samples collected from trenches (TP-11B, TP-11C, TP-12C, TP-13B, TP-13C, TP-24A, and TP-26B) characterize the chemical nature of contaminated soil. Analytical data from the DPT borings (DPT-1, DPT-2, and DPT-3) adjacent to the contaminated trenches provide information on the vertical extent of

contamination and the presence of source material in the saturated zone. Three borings, DPT-5, DPT-9, and DPT-10 were drilled at some distance to the west and north of the waste in order to provide additional bounds on the horizontal extent of contamination.

Twelve VOCs were detected in at least one of the soil samples from the Central AOC: 1,1,2-trichloroethane (1,1,2-TCA), 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, benzene, cyclohexane, ethylbenzene, isopropylbenzene, methylcyclohexane, toluene, and xylenes. 1,1,2-TCA, 2-hexanone, benzene, ethylbenzene, and xylenes were detected at concentrations exceeding EPA residential RSLs.

The only chlorinated solvent, 1,1,2-TCA, was detected only in the two samples from TP-13 at concentrations of 25,000 J µg/kg and 28,000 µg/kg. Although the staining at TP-13 extended into the water table, no 1,1,2-TCA was detected in the soil sample from adjacent boring DPT-3. TP-13 was also notable as the only location where significant concentrations of ketones were detected. In particular, sample TP-13C, collected from a depth of 4.5 to 5 feet, contained 86,000 J µg/kg 2-hexanone and 74,000 J 4-methyl-2-pentanone. These two compounds were not detected in the other sample from TP-13 or in any other soil sample from the Central AOC.

Soils in TP-13 also had elevated levels of cyclohexane (up to 38,000 µg/kg in TP-13C), methylcyclohexane (up to 66,000 in TP-13C), isopropylbenzene (up to 59,000 µg/kg in TP-13C), ethylbenzene (16,000 µg/kg in TP-13C), and xylenes (59,000 µg/kg in TP-13C). A similar suite of VOCs was detected in TP-24A; however, concentrations were generally lower. In addition, other aromatic hydrocarbons, benzene (550 µg/kg) and toluene (1,900 µg/kg), were also detected in TP-24A. Soil from trench TP-11, located south of TP-24, contained only three VOCs: isopropylbenzene (11,000 J µg/kg), methylcyclohexane (170,000 µg/kg), and xylenes (45,000 µg/kg). Soil from 13 to 13.5 feet bgs at DPT-1, located adjacent to TP-11 and TP-24, contained the same compounds found at TP-24 but at concentrations 1 to 2 orders of magnitude higher than at TP-24.

No VOCs were detected in soil from TP-12C (the northeast boundary of the Central AOC) and TP-26B (the northern edge of the Central AOC).

Several SVOCs, particularly the PAHs, were detected in soils in the Central AOC. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-c,d)pyrene, and naphthalene were detected in at least one sample at concentrations exceeding the residential RSLs. Benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene were detected in one sample (from 4 to 4.5 feet in TP-26B) at concentrations exceeding industrial RSLs. Naphthalene was detected in one sample (from 13 to 13.5 feet in DPT-1DPT1) at a concentration exceeding its industrial RSL.

In TP-11, the concentration of total high molecular weight [HMW] PAHs was 1,194 µg/kg (in TP-11B), and the concentration of low molecular weight (LMW) PAHs was 6,060 µg/kg (in TP-11C). At the adjacent trench, TP-24, concentrations of HMW and LMW PAHs were 7.810 and 3,267 µg/kg, respectively. The sample from the central segment of TP-26 (the northern extension of TP-11) contained the highest concentrations of PAHs: 229,200 µg/kg HMW PAH and 62,730 µg/kg LMW PAH. The deeper (13 to 13.5 feet bgs) soil sample from the adjacent soil boring, DPT-1, also contained elevated PAHs: 8,800 µg/kg HMW PAH and 25,200 µg/kg LMW PAH.

Relatively low concentrations of PAHs (3,740 µg/kg LMW PAHs and no detected HMW PAH) were detected in TP-13. No SVOCs were detected in soil from DPT-2 (9.5 to 10 feet bgs at TP-12) or DPT -3 (4.5 to 5 feet at TP-13).

Aluminum, antimony, arsenic, chromium, cobalt, iron, and lead were present in at least one soil sample at concentrations exceeding residential RSLs. Arsenic (in soil from TP-11B, TP-12C, TP-24A, TP-26B, and DPT-2), chromium (in soil from TP-11B, TP-11C, TP-12C, TP-13B, TP-24A, DPT-2, and DPT-9), and lead (TP-26B and DPT-2) were detected at concentrations exceeding the industrial RSLs. Concentrations of each of these three metals exceeded site background concentrations at TP-26B, and chromium and lead exceeded site background in the sample from 9.5 to 10 feet at DPT-2. The soil in TP-26B had the most metals that exceeded the background concentrations and the highest detected concentrations of these metals.

Three borings were drilled outside of the suspected area of contamination to confirm the presence or absence of waste material in these locations. Boring DPT-5 was drilled on the west side of the access road, opposite the Central AOC. DPT-9 was also drilled on the west side of the access road and was located within the original suspected boundaries of the Northern AOC, and DPT-10 was drilled north of the Central AOC, about mid-way between MW-6 and the northern extent of waste in the Central AOC. Soil in DPT-5 contained 1.9 J µg/kg of toluene; DPT-9 contained similar concentrations of xylene (1.8 J µg/kg.) and 110 J µg/kg of BEHP. No organic constituents were found in the soil from DPT-10. None of the organic constituents exceeded residential RSLs. Concentrations of arsenic and chromium exceeded the residential RSL in each boring; sodium was the only metal to exceed background concentrations in samples from these three borings.

Southern AOC

Soil collected from trenches and shallow temporary well borings from the Southern AOC (**Table 4-3**) were analyzed for VOCs, SVOCs, and TAL metals; two samples were also analyzed for dioxins/furans. The samples collected from trenches (TP-18B, TP-19A, TP-20B, TP-21A, TP-22B, and TP-27A) characterize the chemical nature of contaminated soil. Analytical data from the DPT borings (DPT-4, DPT-6, DPT-7, and DPT-8) adjacent to the contaminated trenches provide information on the vertical extent of contamination and the presence of source material in the saturated zone.

Five VOCs were detected at least one time in the samples from the Southern AOC trenches: 2-butanone, acetone, benzene, methylene chloride, and toluene. As shown on **Table 4-3**, detections of these contaminants were fairly sporadic, and there is no consistent pattern to the detections. No VOCs were detected in TP-18B, TP-19A, and TP-21A. Acetone (84 µg/kg) and 2-butanone (25 µg/kg) were detected inTP-20B as well as in the adjacent DPT-8 (35 µg/kg and 7.9 J µg/kg, respectively). The sample from DPT-8 was collected at similar depth (4.5 to 5 feet bgs) as the sample from TP-20 (4 to 4.5 feet). No VOCs were detected at concentrations exceeding EPA residential RSLs.

SVOCs, particularly PAHs, were also detected sporadically in soil samples from the Southern AOC. The exception is the sample from 3 to 3.5 feet bgs from TP-21A. That sample contained 3,000 µg /kg total HMW PAHs and 516 µg/kg LMW PAHs. These HMW and LMW PAH concentrations are about an order of magnitude higher than the second highest concentrations. No staining was noted in the trench log for TP-21A although debris (glass and

metal) was noted and there was a low (1.5 ppm) detection of volatile organic vapors. One SVOC, benzo(a)pyrene, was detected at a concentration (270 µg/kg) exceeding the EPA residential soil RSL of 110 µg/kg in a sample from TP-21A; it did not exceed the industrial RSL (2,100 µg/kg) or the site background (410 µg/kg)

Two samples from TP-20B and TP-27A were analyzed for dioxins and furans. The sample from TP-27A consisted of sandy silty fill in a zone of debris. The sample from TP-27A exceeded the residential and industrial RSL for 2,3,7,8-TCDD when expressed as TEQ. All seventeen congeners of dioxin and furan were detected in the sample from TP-27A although the vast majority (12,600 J picograms per gram [pg/g]) of the sample was octachlorodibenzo-p-dioxin (OCDD). 2,3,7,8-TCDD was detected at a concentration of 1.38 pg/g. There were no non-detected congeners, thus the TEQ ND=0 and TEQ ND=0.5 are the same: 25.8 pg/g (note that the TEF for octachlorodibenzodioxin [OCCD] is 0.0003). The sample from TP-20B was collected from black burned material found at a depth of 4 to 4.5 feet. The dioxin TEQ (ND = 0.5 the DL) of the sample from TP-20B is 4.69 pg/g, less than the EPA residential RSL. Ten congeners were detected in the TP-20B sample or its field duplicate. Similar to the sample from TP-27A, the majority of dioxin in the sample was from OCCD (3,750 J pg/g).

Aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, manganese, and zinc were present in at least one soil sample at concentrations exceeding residential RSLs. Six metals exceeded industrial RSLs: antimony (in soil from TP-18B, TP-19A, TP-27A, DPT-4, DPT-7, and DPT-8), arsenic (in all samples except DPT-6 and DPT-11), chromium (all samples), copper (in DPT-8), iron (in TP-18B, TP-19A, TP-27A, DPT-4, and DPT-8), and lead (TP-18B and DPT-4). Fourteen metals were detected above site-specific background values (Table 4-3): aluminum, arsenic, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, sodium, and zinc exceeded the site background concentrations. Maximum concentrations of these metals were found at one of three locations: TP-18B, DPT-4, and DPT-8. A duplicate sample was collected at one location (DPT-8), and the highest values of some metals were found in the sample and some in the duplicate.

The highest concentrations of arsenic (52 milligrams per kilogram [mg/kg]), cobalt (28 mg/kg), iron (250,000 mg/kg [25 per cent]), manganese (1,600 mg/kg), nickel (120 mg/kg), and sodium (410 J mg/kg) were found in the soil from TP-18B. This soil was collected from 3.5 to 4 feet bgs in a zone of fill waste, including scrap metal. Soil from 6.5 to 7 feet at that location was collected from DPT-6 and contained significantly lower concentrations (about an order of magnitude lower) of all of these metals.

The highest concentrations of barium (300 mg/kg), lead (22,000 mg/kg [2.2 percent]), and zinc 5,400 mg/kg) were found in soil from 7 to 7.5 feet at DPT-4. The highest concentration of antimony (510 mg/kg was also found in this sample; there is no background screening level for antimony, but the concentration in this sample is notable as it is 2 to 3 orders of magnitude above any other concentrations of antimony in Southern AOC soil. DPT-4 was located adjacent to the location of the RI investigation TP-4 where waste was observed.

The highest concentrations of aluminum (37,000 mg/kg), chromium (140 J mg/kg), copper (6,700 mg/kg, and magnesium 2,500 J mg/kg) were detected in the sample from 4.5 to 5 feet bgs at DPT-8 or its duplicate. DPT-8 was collected adjacent to, and just below, the sample from TP-20B (collected from 4 to 4.5 feet bgs). Concentrations of several metals in the sample from TP-20B (or its duplicate) also exceeded the background samples: arsenic (8.5 mg/kg),

calcium (2,500 mg.kg), chromium 58 mg.kg). copper (1,200 mg/kg), lead (310 mg/kg), nickel (50 mg/kg), sodium (80 J mg/kg), and zinc (320 J mg/kg).

Soil was collected from a depth of 9 to 9.5 feet, from one boring (DPT-11) located on the west side of the access road to investigate the presence of waste material west of the road, west of the southern end of the Southern AOC. The only organic constituent detected in that soil was acetone (42 J µg/kg). There was asphalt fill noted in soil from 2.2 to 3.2 feet bgs but no other indications of waste deposition in the soil from DPT-11. The only metal that exceeded background concentrations in that sample was calcium (1,100 mg/kg).

#### 4.2.4.2 Groundwater Water Quality and Analytical Data

Groundwater samples were collected from 17 shallow and 4 deep temporary wells as well as 6 monitoring wells. Samples were collected and analyzed in accordance with the approved FSP and QAPP (CDM Smith 2015). All samples were analyzed for VOCs, SVOCs, and metals. A subset of samples—including those from shallow temporary wells upgradient and within the Southern AOC; all four deep temporary wells; and MW-3, MW-4, and MW-5 during the May 2016 sampling event and all permanent monitoring wells, except MW-6 in November 2016—were analyzed for dioxins and furans. The Town of Chincoteague supply well TOC-06 was sampled for VOCs and dioxins (November 2016) and SVOCs and metals (November 2017). All temporary well data detections are shown on **Table 4-4**, and all monitoring well and water supply well sample analytical results are summarized on **Table 4-5** and **Table 4-6**, respectively.

Water quality data (temperature, dissolved oxygen, oxidation-reduction potential [ORP], pH, and specific conductance) were measured as part of the well purging process during sampling. The final readings prior to sampling are compiled in **Table 4-7.**

Shallow Temporary Wells

At least one VOC was detected in shallow surficial aquifer groundwater samples DPW-1, DPW-2, DPW-3, DPW-5, DPW-7, DPW-14, and DPW-17 at a concentration exceeding the EPA tap water RSL. Most of the exceedances were found in samples from the Central AOC: DPW-1, DPW-2, DPW-3, and DPW-14. Only xylene was detected above screening levels in DPW-5 (also near the Central AOC) and DPW-7 (on the southern edge of the Southern AOC). VOCs that exceeded the tap water RSLs in these samples include benzene, ethylbenzene, 1,2-dichloroethane (only in DPW-17), cis-1,2-DCE (only in DPW-2), isopropylbenzene, PCE (only in DPW-14), toluene, and xylenes.

Twenty-three SVOCs were detected in at least one shallow temporary well groundwater sample. 1,1-biphenyl, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and naphthalene were detected in at least one sample at concentrations exceeding the EPA tap water RSL. Samples with an RSL exceedance included DPW-1, DPW-2, DPW-3, DPW-5, DPW-6, DPW-7, DPW-10, DPW-14, and DPW-15. Except DPW-6 and DPW-7, these locations were collected in or near the Central AOC. Naphthalene was the SVOC most frequently found at concentrations above the tap water RSL.

Shallow surficial aquifer groundwater from five shallow temporary wells (DPW-4, DPW-8, DPW-15, DPW-16, and DPW-17), all located upgradient, within, or on the downgradient edge of the Southern AOC, was analyzed for dioxin/furans. OCDD was the only congener of dioxin that was detected in any of these samples. The TEQ calculated based on ND=0 resulted in no

exceedances of the dioxin tap water RSL. All of the TEQs calculated with ND=0.5 of the detection limit exceeded the RSLs because these calculations are dominated by the analytical detection limits.

Arsenic, barium, chromium, cobalt, and manganese were detected in shallow temporary monitoring well groundwater samples at concentrations exceeding the EPA tap water RSLs. None of the samples contained arsenic or barium concentrations that exceeded site background concentrations. There are no cobalt or manganese Site-specific groundwater concentrations (Tetra Tech 2004). The concentration of zinc in samples DPW-7, DPW-9, DPW-10, and DPW-16 exceeded the VWQC; samples from DPW-7 and DPW-10 also exceeded the site-specific background concentration for zinc.

Deep Temporary Wells

Eight VOCs (benzene, carbon disulfide, chloroform, ethylbenzene, isopropylbenzene, toluene, methylcyclohexane, and xylenes) were detected in one or two deep surficial aquifer groundwater samples. Benzene (in DTW-1), chloroform (DTW-2), ethylbenzene (DTW-2), and toluene (DTW-4) were detected in concentrations that exceeded the tap water RSL. No VOCs were detected in DTW-3 (located in the Southern AOC).

Ten SVOCs were detected in one or two deep surficial aquifer groundwater samples. Only naphthalene was detected in one temporary shallow well (DTW-1) at a concentration exceeding an RSL. No SVOCs were detected in DTW-2 or DTW-3.

Groundwater from all four deep temporary wells was analyzed for dioxins/furans. Similar to the shallow temporary well results, OCCD was detected in each sample; the sample from DTW-2 (located in the Central AOC) also contained 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD), 1,2,3,4,6,7,8-heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF), and 2,3,7,8-TCDD. The TEQ ND=0 in DTW-1, DTW-3, and DTW-4 did not exceed the EPA tap water RSL. The TEQs calculated with one-half the detection limits all exceeded the tap water RSL. The concentration of 1,2,3,4,6,7,8-HpCDD, 71.4 picograms per liter (pg/l), exceeded the tap water RSL for that congener (13 pg/l) as did the concentration for 2,3,7,8-TCDD (4 J pg/l), and the TEQ (1.98 pg/l).

Four metals exceeded the tap water RSL in at least one deep temporary well groundwater sample: arsenic (DTW-3), barium (DTW-1), cobalt (all deep surficial aquifer groundwater), and manganese (all deep surficial aquifer samples). The concentrations of arsenic in DTW-3 and barium in DTW-1 did not exceed site-specific background concentrations. There are no site-specific background concentrations for cobalt and manganese. No metals concentrations exceeded VWQC.

Monitoring Wells

Monitoring well groundwater data are shown in **Table 4-5**. One organic constituent, naphthalene (0.083 µg/l) was detected in the November 2016 sampling event in the CDL background well MW-1. Arsenic and chromium were also detected in samples from at least one sampling round in MW-1 at concentrations exceeding EPA tap water RSLs.

Several VOCs were detected in MW-4 (see **Table 4-5**). Concentrations of cis-1,2-DCE, 1,2-dichloroethane, ethylbenzene, isopropylbenzene, toluene, and xylenes exceeded tap water RSLs.

Fifteen SVOCs, mostly PAHs were detected in at least one downgradient monitoring well. The highest concentrations were generally found in samples from both sampling events in MW-4, located downgradient of the Central AOC. Lower concentrations of several PAHs were also detected in the sample collected from MW-5 in November 2016. 1,1-biphenyl and 2-methylnaphthalene (only in MW-4) and naphthalene (MW-3 and MW-4) exceeded the tap water RSL.

Arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, vanadium, and zinc exceeded EPA tap water RSLs in at least one sample. Concentrations of all these metals in the November 2016 sample from MW-5 (downgradient of the Central AOC) exceeded their respective EPA RSLs. Some of these metals (arsenic, cadmium, cobalt, copper, iron, lead, manganese, mercury, and zinc) exceeded the site-specific background (Versar 2004) and/or VWQC in that sample. Cadmium concentrations from the November 2016 samples from MW-3 and MW-4 exceeded both the VWQC and site background screening levels.

Water Supply Well TOC-6

Groundwater from TOC-06 was analyzed for VOCs, SVOCs, dioxins/furans, and metals (see **Table 4-6**). The only organic constituent detected was caprolactam, an SVOC. The aliquot for SVOC analysis was run in triplicate (a field sample and two field duplicates). Caprolactam was detected in two of the three samples at concentrations of 1.2 J and 0.92 J µg/l). The tap water RSL for caprolactam is 990 µg/l, and there is no MCL or other criteria for caprolactam.

No dioxin or furan congeners were detected in the sample. The resulting dioxin TEQ ND=0 is 0; the TEQ ND=0.5 is 20 pg/l. The MCL for dioxin is 30 pg/l. The tap water RSL is 0.12 pg/l.

The concentration of iron exceeded the secondary MCL; the concentration of manganese did not exceed the secondary MCL.

Constituents found in both the surficial aquifer wells (monitoring wells) and Yorktown aquifer (TOC-06) include common ions (calcium, potassium, and sodium) and iron, magnesium, and manganese. There are no screening criteria for calcium and potassium. There are no MCLs or RSLs for sodium or magnesium. Both sodium and magnesium were detected in surficial aquifer groundwater monitoring wells at concentrations below the Virginia Groundwater Quality Criteria. Iron and manganese were each detected in at least one monitoring well groundwater sample at concentrations exceeding the RSLs and Secondary MCLs. (Note that the monitoring well data were not screened against secondary MCLs in Table 4-5).

#### 4.2.4.3 Pore water Analytical Data

Detections of analytes in background and site pore water samples are presented in **Tables 4-8 and 4-9**, respectively. The water quality parameters measured during pore water sampling are listed in **Table 4-12**.

Background Samples

Pore water was collected from three background locations (see **Figure 3-2**): PW-11, PW-12, and PW-20. No VOCs or SVOCs were detected in any of the background pore water samples. One congener of dioxin, OCDD, was detected in the sample from PW-11 (56.4 pg/l). The TEQ with ND=0 is 0.0169 pg/l, above the BTAG estuarine screening level (0.0031 pg/l).

Three metals, arsenic, magnesium, and sodium exceeded the EPA BTAG estuarine screening levels in the samples from PW-12 and PW-20. The barium screening level was exceeded in PW-12, and the cadmium screening level was exceeded in pore water from PW-20.

Site Samples

Two VOCs, carbon disulfide and PCE, were detected in pore water samples. Carbon disulfide was detected in PW-14, PW-17, and PW-21. Concentrations of carbon disulfide exceeded the screening criterium (0.92 µg/l) in each sample where it was detected. The highest concentration (23 µg/l) of carbon disulfide was found in the downstream sample, PW-21. PCE was detected in one sample, PW-17, at a concentration of 5.3 µg/l. This concentration does not exceed the screening level of 45 µg/l.

One SVOC, BEHP, was detected in pore water from one location, PW-18, at a concentration of 0.75 µg/l. This is less than the BTAG screening level of 16 µg/l.

One congener of dioxin, OCDD, was detected in PW-13, PW-14, PW-15, PW-16, PW-18, and PW-19. In each sample, the dioxin TEQ with ND=0 exceeded the screening level of 0.0031 pg/l; in all samples except PW-13, the concentrations of OCDD and TEQ exceeded the maximum concentration and TEQ in the background samples. The highest concentrations were detected in PW-19 (TEQ of 0.045 pg/l).

Concentrations of several metals, including arsenic, barium, cadmium, magnesium, manganese, potassium, and sodium, exceeded their respective BTAG estuarine screening levels. Cadmium (0.0012 µg/l) in PW-14, PW-16, and PW-21 also exceeded the maximum cadmium concentration in a background sample. Potassium and sodium equaled or exceeded maximum background concentrations in several pore water samples, including PW-15 and PW-16 (sodium exceedance only) and PW-18, PW-19, and PW-21.

#### 4.2.4.4 Sediment Analytical Data

Detections of analytes in background and site pore water samples are presented in **Tables 4-10** and **4-11**, respectively.

Background Samples

Three VOCs, 2-butanone, acetone, and carbon disulfide were each detected in two of the background sediment samples, SD-11 and SD-20. There are no BTAG sediment screening criteria for these compounds. No SVOCs were detected in background sediment samples.

Three dioxin congeners were detected in at least one background sample: 1,2,3,4,6,7,8-HpCDD, 2,3,7,8-TCDD, and OCDD. 2,3,7,8-TCDD was only detected in SD-11, and the other two congeners were detected in each background sample. The dioxin TEQs with ND=0 range from 0.104 to 0.353 pg/g. The BTAG sediment screening level is 0.85 pg/g.

No metals concentrations in samples SD-11 and SD-20 exceeded screening levels. Concentrations of arsenic (13 J mg/kg), chromium (54 J mg/kg), copper (19 J mg/kg), iron (29,000 mg/kg), and nickel (24 J mg/kg) exceeded the BTAG estuarine screening levels (7.24, 52.3, 18.7, 20,000, and 15.9 mg/kg, respectively) in sample SD-12.

Site Samples

Four VOCs, 2-butanone, acetone, carbon disulfide, and carbon tetrachloride, were detected in at least one sediment sample. Only carbon tetrachloride has a BTAG screening value: 7,240

µg/kg. The one detection of this compound, in SD-21 at 30 J µg/kg, is well below the screening level. The concentrations of 2-butanone, and acetone are below the maximum background concentrations in all samples, except SD-13, the most upstream sediment sample. The concentration of carbon disulfide in SD-18 (180 µg/kg) exceeded the highest concentration in the background samples (82 µg/kg). All other samples had concentrations of carbon disulfide below the maximum background concentration.

One SVOC, the PAH fluoranthene, was detected in site sediment. It was detected in one sample (SD-16) at a concentration (17 µg/kg) below the screening level (113 µg/kg).

Seven dioxin or furan congeners were detected in at least one sediment sample. Dioxin TEQ with ND=0 ranged from 0.0098 pg/g in SD-17 to 3.62 pg/g in SD-16. The screening level (0.85 pg/g) was exceeded in SD-14, SD-16, SD-19, and SD-21.

Arsenic, iron, and nickel concentrations in nearly all sediment samples exceeded the screening levels, but only in SD-19 did the concentrations of these three metals exceed the maximum concentration found in a background sample. Chromium in that sample (59J mg/kg) exceeded both the screening level (52.3 mg/kg) and the maximum background concentration (54 J mg/kg).

## 4.3 Distribution of Contamination in Soil, Groundwater, Sediment and Pore water

Chemicals of potential concern (COPCs) and chemicals of potential ecological concern (COPECs) were defined in the HHRA and ERA and updated in the HHRA and ERA addenda (**Appendices F** and **G**, respectively)**.** The COPCs and COPECs, collectively called COPCs in this SFI report, are shown for each media (soil, groundwater, pore water, and sediment) in **Table 4-13**. The discussion focusses on the COPCs determined in the HHRA and ERA (Versar 2013) as well as new COPCs and COPECs identified in the HHRA and ERA addenda performed with data collected in the SFI. The full risk assessment addenda are provided in **Appendices F** and **G** of this report.

### 4.3.1 Soil

Defining the horizontal extent of the COPCs (or COPECs) in soil was not a primary objective of this SFI; however, some correlations of COPCs in soil can be made to the waste and areas of stained soil. In the RI (Versar 2013), COPCs were identified for surface soils and aggregate (0 to 10 feet bgs) soils. In this SFI, only the aggregate soil COPCs are relevant as no surface soil samples were collected.

The RI states that “Screening for 2,3,7,8-dioxin in soil samples was negative for all samples” (Versar 2013); although dioxin/furans are not mentioned as analytes in the RI report. Dioxins/Furans were not identified in any of the risk documents as COPCs for soil; therefore, sampling for these parameters in soil in the SFI was limited to two samples deemed to be the most likely to be contaminated with dioxins due to the presence of burned material. A discussion of the location and nature of dioxin/furans in soil is provided to inform the discussion of the conceptual site model in Section 4.4.

#### 4.3.1.1 Volatile Organic Compounds

VOC aggregate soil COPCs include benzene, cyclohexane, 1,2-dicloroethane, ethylbenzene, 2-hexanone, isopropylbenzene, 4-methyl-2-pentanone (MIBK), 1,1,2-trichloroethane, toluene, and xylenes (m,p-xylene, o-xylene, and total xylenes). 1,2-dichloroethane was not detected in the SFI samples. Five of these VOCs, benzene, cyclohexane, ethylbenzene, isopropylbenzene, and xylene, were detected in one or more SFI soil samples.

In the Central AOC samples from TP-11A, TP-11B, TP-13B, TP-13C, TP-24A, and DPT-1, all within the area of the northern lobe of stained soil, contained one or more of the VOC COPCs. Xylene and isopropylbenzene were the most widespread and were detected in the same six samples; only the concentration of xylene in soil from TP-13C exceeded the EPA residential RSL. That sample, as well as the sample from TP-13B, also contained ethylbenzene at concentrations exceeding the residential RSL. Two COPCs, 2-hexanone and MIBK, were only detected in one SFI soil sample, TP-13B; concentrations of 2-hexanone exceeded the EPA RSL. Samples from TP-13 (both TP-13B and TP-13C) were the only ones to contain 1,1,2-trichloroethane; concentrations in both samples exceeded the EPA residential RSL.

In the Southern AOC, the only SFI soil samples that had a detectable concentration of a VOC COPC were from TP-27 (1.4 J µg/kg benzene) and DPT-4 (2.2 J µg/kg of toluene).

#### 4.3.1.2 Semi-volatile Organic Compounds

SVOC COPCs in aggregate soil included seven PAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, dibenzofuran, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene. Dibenz(a,h)anthracene and phenanthrene were not detected in any SFI soil sample.

In the Central AOC, one or more SVOC COPCs was detected in all soil samples collected from trenches as well as the soil from DPT-1. SVOC COPCs at concentrations exceeding the EPA residential RSL were found in TP-11B, TP-11C, TP-12C, TP-24A, TP-26B, and DPT-1. The highest concentrations were detected in TP-26B. The sample from TP-26B also contained the most (four) COPCs with concentrations exceeding the EPA residential RSLs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-c,d)pyrene. These soil samples were collected in areas of the stained soil.

The detected concentrations of SVOC COPCs in soil from the Southern AOC were generally lower than those from soil in the Central AOC. No SVOC COPCs were detected in soil from TP-18B, TP-19A, TP-22B, TP-27A, DPT-4, and DPT-6. Most of the other soil samples from the Southern AOC only contained one or two SVOC COPCs that were present at relatively low concentrations. The most SVOC COPCs, nine, were detected in the sample from TP-21A; the concentration of benzo(a)pyrene in that sample exceeded the EPA residential RSL.

#### 4.3.1.3 Dioxins/Furans

Two soil samples collected in the Southern AOC were analyzed for dioxins/furans: TP-20B and TP-27A. The sample from TP-27A contained each of the 17 dioxin/furan congeners. However, the congener detected at highest concentrations is OCDD (12,600 J pg/g). The congener with the second highest concentration is 1,2,3,4,6,7,8-HpCDD (289 pg/g); 1,2,3,4,6,7,8-HpCDF was the third highest (45.4 pg/g). The remaining congeners were

present at concentrations less than 13 pg/g. The dioxin TEQ for this sample, 25.8 pg/g, exceeded both the EPA residential RSL (4.8 pg/g) and the industrial RSL (22 pg/g).

Soil from TP-20B contained 10 of the 17 dioxin/furan congeners. The highest-concentration congeners were the same as in the sample from TP-27A: OCDD (3,750 pg/g), 1,2,3,4,6,7,8-HpCDD (59.5 J pg/g), and 1,2,3,4,6,7,8-HpCDF (14.4 pg/g). The remaining congeners were present at concentrations less than 3 pg/g. The dioxin TEQ (ND=0.5 the DL) is 4.69 pg/g, i.e., less than the EPA residential RSL.

#### 4.3.1.4 Metals

The distribution of metals contamination described here includes soils containing concentrations of COPCs that are both above the site-specific background (and therefore are site-related) and exceed an EPA RSL.

Only three Central AOC soil samples contained one or more metals at a concentration considered to be Site-related and exceeding an RSL: TP-11B (aluminum at 18,000 mg/kg and iron at 14,000 mg.kg), TP-26B (arsenic at 59 mg/kg, chromium at 63 mg.kg, cobalt at 12 mg/kg, iron at 35,000 mg/kg, and lead at 1,000 mg/kg), and DPT-2 (chromium at 22 mg/kg and lead at 4,900 mg/kg). All three soil samples were collected in intervals of waste. The sample from 11B was at a depth of 11 to 12 feet and was stained soil.

Site-related metals contamination in soil was more widespread in the Southern AOC. Samples from TP-18B, DPT-4, DPT-7, and DPT-8 contained seven or more metals at concentrations above both the site screening level and EPA residential RSLs. Typically, these four samples contained aluminum arsenic, cadmium, chromium, cobalt, copper, iron, and lead. Each sample was collected from intervals that contained waste.

Several samples from the AOC soils contained no metals exceeding both RSL and site-specific screening criteria (TP-22B) or only iron or aluminum at concentrations exceeding the residential RSL (TP-21A, TP-27A [a duplicate had residential RSL exceedances for chromium and cobalt], DPT-6, and DPT-11). Although the soil from 1.5 to 2 feet at TP-22B did not contain metals contamination, a slightly shallower sample (from 0.5 feet to 1 foot) from the adjacent boring DPT-7 contained several site-related metals at concentrations exceeding residential RSLs. Plastic debris was noted in the DPT-7 soil log at the sample interval. Debris, including metal scrap, was noted in the TP-21A trench at the sample interval (3 to 3.5 feet); only iron exceeded the residential RSL. The sample from TP-27 was collected at a depth interval, 1.5 feet, that contained several types of debris, including metals springs, pipes, and corroded material). Boring DPT-11 was located on the west side of the access road where no waste was found.

In general, the presence of debris was not a good predictor of the presence of metals contamination. However, in the areas where debris was not found, no metals exceeded both the site-specific background and an RSL.

### 4.3.2 Surficial Aquifer Groundwater

The extent of contamination in groundwater is defined in this report based on the presence of COPCs determined in the HHRA (Versar 2013) or the HHRA addendum (**Appendix F**). The derivation of COPCs for each media is explained in the RI report (Versar 2013).

Groundwater samples were collected from the shallow and deep sections of the surficial aquifer. Samples collected from the “shallow surficial aquifer” are those considered near the observed water table. Samples collected from the “deep surficial aquifer” were collected from a temporary well with the screen installed just above the Yorktown Clay confining unit. Therefore, the samples were collected from the deepest part of the surficial aquifer. The depths of the mid-points of these deep temporary well screens ranged from 49.5 feet (DTW-3) to 61.5 feet (DTW-1).

#### 4.3.2.1 Volatile Organic Compounds

The VOC COPCs for groundwater derived in the 2013 HHRA include chlorinated hydrocarbons (1,2-dichlorethane [1,2-DCA], cis-1,2-DCE, and PCE), BTEX, isopropylbenzene, and methylene chloride. Chloroform and cyclohexane were added as COPCs in the HHRA addendum (**Appendix F**).

During the RI, groundwater samples were collected in May and December 2007. Chlorinated hydrocarbons were only detected in samples from MW-4 (PCE [7.9 to 13.9 µg/l], TCE [2.6 to 3.6 µg/l], and cis-1,2-DCE [45.4 to 54.8 µg/l]) and MW-5 (1,2-DCA [8.8 to 17.5 µg/l]).

Monitoring MW-4 is located downgradient of the Central AOC. Groundwater in MW-4 did not contain any TCE in 2016, and concentrations of PCE (3.8J µg/l in May 2016) and cis-1,2-DCE (21 to 22 µg/l) were lower than previously detected in the RI. The detection limits in November 2016 samples were elevated and could have masked low levels of TCE. One shallow temporary well, DPW-14, contained 14 J µg/l of PCE and no cis-1,2-DCE. DPW-14 is located upgradient of the Central AOC and within the area of stained soil. As in 2007, the extent of PCE and cis-1,2-DCE is limited to the Central AOC. The work performed in the SFI indicated that PCE is present upgradient of the AOC at concentrations above the RSL of 4 µg/L.

The concentration of 1,2-DCA, 0.59 J µg/l, detected in the May 2016 sample from MW-5 (off the northeast corner of the Central AOC) was also significantly less than the 2007 concentrations. 1,2-DCA was detected in one shallow temporary well, DPW-17 (located south of the Southern AOC), at a concentration of 0.2 J µg/l. All the concentrations detected in 2016 were below the EPA RSL (2.8 µg/l).

Chloroform was only detected in one deep surficial aquifer sample, DTW-1 and therefore is not widespread. The remaining groundwater VOC COPCs (BTEX, cyclohexane, and isopropylbenzene) were found in relatively higher concentrations in shallow surficial aquifer groundwater in an area in the northern and central part of the Central AOC: DPW-1, DPW-2, DPW-3, and MW-4. Fewer of them (e.g., no benzene) and lower concentrations were found upgradient of the Central AOC but within the area of stained soil at DPT-14. DPW-5 appears to be at the northwest edge of the area of groundwater contamination as only xylene was found at concentrations exceeding an RSL.

In the deep surficial aquifer, relatively low concentrations of ethylbenzene, isopropylbenzene, and toluene were found in DTW-1. Only the concentration of ethylbenzene exceeded an RSL. Toluene (150 µg/l) was also detected in DTW-4. No toluene was detected in DTW-2 or DTW-3; the extent of elevated concentrations of toluene in the deep surficial aquifer is limited to the area around DTW-4.

#### 4.3.2.2 Semi-Volatile Organic Compounds

The SVOC COPCs identified in the RI include 2-methylnapthalene and naphthalene; 1,1-biphenyl, benzo(a)anthracene, benzo(a)pyrene, benzo(b) fluoranthene, and dibenzofuran were added as COPCs in the HHRA addendum (**Appendix F**).

The distribution of 1,1-biphenyl, 2-methylnaphthalene, and naphthalene is similar to that of the BTEX and cyclohexane COPCs: DPT-1, DPT-2, DPT-3, and MW-4 with lower concentrations found in DPW-14 and DPW-5 on the west side of the access road across from the Central AOC. Naphthalene was detected in relatively low concentrations, but above RSLs, downgradient of the Southern AOC at MW-3. Groundwater in MW-5, located on the northeast corner of the Central AOC, also had relatively low concentrations (below RSLs) of benzo(b)fluoranthene and naphthalene.

The locations where the remaining groundwater SVOC COPCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b) fluoranthene, and dibenzofuran) were detected includes points along the north and northeast of the Central AOC (DPT-1, DPT-5, DPT-10, and MW-5) and one location side-gradient of the Southern AOC (DPT-7).

The only SVOC groundwater COPCs detected in the deep surficial aquifer were found at DTW-1, located adjacent to DPT-1. Naphthalene (above the RSL) and 2-methylnaphthalene (below the RSL) were detected in DTW-1. SVOC contamination is limited to the shallow surficial aquifer, except near DTW-1.

#### 4.3.2.3 Dioxin/Furans

Dioxin TEQ is a groundwater COPC identified in the HHRA addendum (**Appendix F**). OCCD was the only congener detected in shallow surficial groundwater samples analyzed for dioxins/furans. It was detected in all samples analyzed, except the sample from the background well, MW-1. Locations where it was detected include DPT-4, DPT-8, DPT-15, DPT-16 DPT-17, MW-2, MW-3, MW-4, and MW-5. The TEQ (ND=0) ranged from 0.0112 pg/l at DPT-17, south of the Southern AOC, to 0.0619 pg/l at DPT-8, located downgradient of the Southern AOC. Dioxin TEQ did not exceed the RSL at any sampling locations in the shallow surficial aquifer.

All the deep surficial aquifer groundwater samples were analyzed for dioxins/furans, and dioxin congeners were detected in samples for DTW-1 and DTW-2, both located downgradient of the Central AOC. The highest dioxin TEQ (ND=0) was 1.98 pg/l, above the RSL of 1.2 pg/l in DTW-2.

#### 4.3.2.4 Metals

Metals were detected at concentrations above both an RSL and site-specific background concentrations in samples from MW-5 (arsenic, cadmium, cobalt, copper, iron, lead, manganese, and zinc) and MW-3 (copper). Both locations are immediately downgradient of waste material in the shallow surficial aquifer. Midpoints of the well screens are at depths of 8 feet (MW-3) and 28 feet (MW-5).

There are no metals in the deep surficial aquifer groundwater at concentrations that exceed both the RSL and Site background concentrations.

### 4.3.3 Yorktown Aquifer Groundwater

One Yorktown Aquifer well, Town of Chincoteague drinking water supply well TOC-06, was sampled. Iron and manganese were detected in the Yorktown Aquifer well. The iron concentration, 0.41 milligrams per liter (mg/l), did not exceed the EPA RSL (1.4 mg/l) using 1/10 the noncancer Hazard Index (HI); the iron concentration slightly exceeded the secondary MCL (0.30 mg/l). Secondary MCLs are set for contaminants that are not health-threatening but may impact the water color, taste, or smell. The manganese concentration in the Yorktown Aquifer sample (0.0069 J mg/l) did not exceed the EPA RSL (0.043 mg/l) using 1/10 the noncancer HI or the secondary MCL (0.05 mg/l).

There is no evidence of site-related contamination in the Yorktown Aquifer groundwater in the sample from TOC-06.

### 4.3.4 Pore Water

#### 4.3.4.1 Volatile Organic Compounds

There are no VOC human health COPCs or ecological COPECs for pore water (based on surface water screening levels; see **Appendices F** and **G**). Carbon disulfide was detected in three locations, PW-14, PW-17, and PW-21. These three locations are relatively far (about 370 feet) from each other and are not adjacent to each other, i.e., there are locations with no carbon disulfide between each of these locations. Carbon disulfide is a natural product of natural anaerobic biodegradation such as is expected to be occurring in marshlands. Due to this pattern of occurrence, carbon disulfide is not considered to be site-related. PCE was detected in PW-17, collected east of the southern AOC, at a concentration of 5.3 µg/l. The concentration is less than the BTAG screening value (45 µg/l) but is considered Site-related as PCE has been detected in Site groundwater.

#### 4.3.4.2 Semi-volatile Organic Compounds

There are no SVOC human health or ecological COPCs in pore water. The only SVOC detected was BEHP in pore water from PW-18. The concentration (0.75 µg/l) was less than the BTAG screening level.

#### 4.3.4.3 Dioxin/Furans

Dioxin TEQ is not a COPC in pore water. The only dioxin or furan congener that was detected in pore water was OCDD. The dioxin TEQ (ND=0) exceeded the maximum background concentration at PW-14, PW-16, PW-18, and PW-19.

#### 4.3.4.4 Metals

Metal COPCs in pore water include arsenic, barium, cadmium, manganese, and mercury. Arsenic, barium, and manganese were not detected in any pore water samples at concentrations exceeding background samples. Cadmium was found at PW-14, PW-16, and PW-21 at concentrations exceeding maximum background concentrations and the BTAG estuarine water screening level. PW-14 and PW-16 are upstream and downstream of the Central AOC (see **Figure 3-2**). PW-21 is the most downstream sample from the pore water data set.

Mercury was only detected in one location, PW-18; it was not detected in background pore water. The detected concentration did not exceed the BTAG estuarine water screening level. PW-18 is located in the marsh adjacent to the Southern AOC.

## 4.3.5 Sediment

### 4.3.5.1 Volatile Organic Compounds

There are no VOC human health COPCs for sediment; the COPECs are carbon disulfide. Only carbon disulfide in sediment from SD-18 and carbon tetrachloride in sediment from SD-21 exceeded concentrations of these compounds in the site background samples (see **Table 4-11**). Location SD-18 is slightly downstream (south) of the Southern AOC, and location SD-21 is the most downstream location (see **Figure 3-2**).

Carbon disulfide can be produced naturally in areas where anaerobic biodegradation is occurring, such as a marsh. Carbon disulfide is not considered to be site-related.

### 4.3.5.2 Semi-volatile Organic Compounds

There are no SVOC human health COPCs for sediment. BEHP is an ecological COPC. No BEHP was detected in sediment samples collected in the SFI. During the RI, two sediment samples, SD-5 located upstream of the Central AOC and SD-10 collected downstream of the Southern AOC, contained BEHP.

### 4.3.5.3 Dioxin/Furans

Dioxin TEQ is a COPEC in sediment. Sediment locations with a dioxin TEQ (ND=0) higher than background concentrations include SD-15, SD-16, SD-19, and SD-21. Locations SD-15 and SD-16 are in the marsh east of the Central AOC. SD-19 and SD-21 are downstream of the Southern AOC. The highest concentration of dioxin TEQ ND=0 was detected at SD-16 (3.62 pg/g).

All of the sediment samples contained the OCCD congener, and all, except the sediment from SD-17, contained 1,2,3,4,6,7,8-HpCDD. Sediment from SD-16 contained seven congeners. As with the soil samples, the congener with the highest concentration was OCDD; generally, the concentration of OCDD was 1 to 2 orders of magnitude higher than the concentration of the second highest concentration congener, 1,2,3,4,6,7,8-HpCDD.

### 4.3.5.4 Metals

Metal COPCs include aluminum, arsenic, beryllium, chromium, mercury, nickel, and vanadium. Aluminum, arsenic, chromium, nickel, and vanadium only exceeded the respective maximum background concentrations in sediment from SD-19, located immediately downstream of the discharge point of the drainage ditch that flows east to west south of the Southern AOC. Aluminum does not have a BTAG screening value. Arsenic, chromium, and nickel exceeded the BTAG screening value at that location as well.

Beryllium was detected at concentrations exceeding the maximum detected background value in all samples except SD-13, SD-14, and SD-15. All the locations where beryllium was detected were immediately east and downstream of the Southern AOC. There is no BTAG screening level for beryllium. Mercury was detected at concentrations above the background concentrations in SD-16, SD-17, and SD-18—all locations immediately east of the Southern AOC. None of the detected concentrations exceeded the BTAG screening value (0.13 mg/kg).

Notably, mercury was not detected in samples from SD-19 and SD-21, downstream of the Southern AOC.

## 4.4 Summary of Extent of Contamination

The aerial extent of waste and stained soil is shown on **Figure 4-1**. Waste is found in a broad arc that ranges from the northern boundary of the Central AOC to three quarters of the way along the southeast edge of the Southern AOC. As shown on **Figure 4-2**, Cross Section C-C,' the waste along the edge of the marsh is fairly shallow and covered with little or no fill. In the northern part of the Central AOC, the waste is found at depths up to 11 feet (see **Figure 4-3**, Cross Section D-D').

The stained soil extends in two lobes in the Central AOC. The southwestern extent has not been fully defined. In one location (Trench TP-24), the stained soil is stained fill and is found several feet above the waste (debris) found at 11 to 12 feet bgs (see **Figure 4-3**, Cross Section D-D'), In other places, the stained soil appears to be found at about the water table and extends a few feet below it.

Delineation of the extent of soil contamination was not an objective of the SFI. However, data from the SFI indicate VOC- and SVOC-contaminated soil is associated with areas of stained soil and debris in the Central AOC. Metals contaminated soil is sometimes, but not always, associated with debris in both the Central and Southern AOCs.

The areal extent of VOC-contaminated shallow surficial aquifer groundwater, shown on **Figure 4-4**, is approximately the extent of the Central AOC and extends westward to at least DPT 14. The area of groundwater contamination does not appear to extend to the marsh although the marsh is expected to be a local groundwater discharge zone. SVOC-contaminated groundwater is mostly co-located with VOC-contaminated groundwater except that naphthalene is found slightly exceeding RSLs at DPT-10 (DPW-10), just north of the VOC contamination, and DPT-6 and MW-3, south of the VOC contamination. Heavier PAHs, benzo(a)anthracene and benzo(a)pyrene, were found at concentrations exceeding RSLs at DPT-7, upgradient of MW-3 (**Figure 4-4**). The SVOC contamination at DPT-7 is not contiguous with the naphthalene contaminated groundwater at MW-3 and DPT-6 because no SVOCs were detected in DPT-8. No site-related VOCs or SVOCs have been detected in the pore water from the marsh sediments (or in surface water samples collected during the RI). Cyclohexane was detected in one sediment sample (the most downstream sediment sample collected in the RI) and may be an indication that VOCs have discharged through the sediment in the past.

Metals contamination in the shallow surficial aquifer appears limited to the locations immediately downgradient of the waste material in both the Central AOC (MW-5) and Southern AOC (MW-3).

Contaminants in the deep surficial aquifer are limited to relatively low concentrations (but exceeding tap water RSLs) in DTW-1, DTW-2, and DTW-4. The detections of organic constituents greater than RSLs in deep surficial aquifer are shown on **Figure 4-5**.

There are no organic COPCs or COPECs for pore water. No pattern of contamination is apparent in the isolated detections of carbon disulfide (which can be produced naturally in anaerobic environments). PCE were detected at concentrations below BGTAG screening

levels in pore water east of the northern end of the Southern AOC and BEHP was detected below screening values east of the Southern AOC. Similarly, no strong pattern of metals contamination is present in the pore water. Cadmium was found near the Central AOC (upstream and downstream of the AOC). Mercury was found in the most downstream pore water sample; however, it was not detected in site soil samples during the SFI. In the RI, mercury was detected in surface soil samples from the Southern AOC.

Similar to the pore water, the SFI sediment samples contained few organic COPCs. Carbon disulfide in sediment from SD-18 and carbon tetrachloride from sediment from SD-21 (the most downstream sample) exceeded concentrations of these compounds in the site background samples. Location SD-18 is slightly downstream (south) of the Southern AOC. Carbon disulfide can be produced naturally in areas where anaerobic biodegradation is occurring, such as a marsh, and is not considered to be site-related. Carbon tetrachloride is also not considered to be site-related because it has not been detected in any other media at the Site in either the RI or SFI.

Although no BEHP, a COPEC, was detected in sediment samples collected in the SFI, two RI sediment samples (one from upstream of the Central AOC and one from downstream of the Southern AOC) contained BEHP. Sediment with a dioxin TEQ (ND=0) higher than background concentrations was found in the marsh east of the Central AOC and downstream of the Southern AOC. The highest concentration of dioxin TEQ was found east of the Central AOC.

Metal COPCs include aluminum, arsenic, beryllium, chromium, mercury, nickel, and vanadium. Aluminum, arsenic, chromium, nickel, and vanadium only exceeded the respective maximum background concentrations in sediment from SD-19, located immediately downstream of the discharge point of the drainage ditch that flows east to west, south of the Southern AOC.

Beryllium was detected at concentrations exceeding the maximum detected background value at locations just east, and downstream, of the Southern AOC. There is no BTAG screening level for beryllium. Mercury was detected at concentrations above the background concentrations in locations immediately east of the Southern AOC. None of the detected concentrations exceeded the BTAG screening value. Notably, mercury was not detected in samples from SD-19 and SD-21, downstream of the Southern AOC. In RI sampling, mercury was detected above screening levels in sediment in the drainage ditch that crosses the Southern AOC.

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# 5. Contaminant Fate and Transport and Conceptual Site Model

The RI, with data collected in the SFI, has identified site contaminants and delineated the sources of contamination at the Site. This section presents a discussion of the properties of the site media and physical and chemical properties of the contaminants that influence how the contaminants migrate through the site media to potential exposure points.

## 5.1 Properties of the Site Media Influencing Contaminant Transport

The physical characteristics of the Site are described in more detail in the RI and Section 2 of this SFI report. Characteristics specific to site contaminant transport are summarized below.

### 5.1.1 Topography and Surface Water Runoff

Site topography is generally flat; however, several drainage ditches cross through or near the AOCs. Surface water drains through the ditches and into the marsh and tidal channel immediately east of the AOCs. In addition, some waste material is exposed along the edge of the marsh; surface runoff from the waste material is a potential pathway for contaminants to enter the marsh.

### 5.1.2 Soil and Sediment Chemistry

Soil and sediment chemistry most impacting the persistence and mobility of contaminants include:

- Redox potential (Eh or ORP)
- pH
- Total organic carbon content

Redox potential of the subsurface soil and sediment affects the variety of contaminants present and their mobility or persistence in the environment. Microbial activity, as would be expected in a marsh, would create reducing conditions. The strongly negative ORP readings and generally low dissolved oxygen in the sediment pore water indicate reducing conditions (see **Table 4-12**).

The pH of soils and sediment affects hydrolysis rates, contaminant solubility, and biodegradability rates. Solubility of inorganics generally increases as pH decreases. Biodegradation rates are typically maximized when soil pH is between 5.5 and 8.5 (EPA 1989). The pH of sediments was not directly measured; however, the pH of pore water was in the range of 6 to 8.

High total organic carbon (TOC) content in soil and sediment increases contaminant absorption and hinders the movement of contaminants through the soil. The TOC of sediment, measured in the RI, ranged from 21,500 to 129,000 mg/kg (2.15 to 12.9 percent).

### 5.1.3 Geology and Hydrogeology

The sands underlying the disposed waste do not contain significant clay lenses that would inhibit movement of groundwater. The Columbia clay, though present in the southern part of the Site, is absent under the Central AOC.

The Yorktown clay was found across the Site at a depth of about 70 to 75 feet. At the water supply well, there is a series of clay members (the uppermost is 44 feet thick) between the bottom of the surficial aquifer and the shallowest interval of the well screen (at a depth of 154 feet).

Groundwater flow in the Central AOC is to the northeast and in the area of the Southern AOC is to the north (**Figure 2-6**). The tidal marsh would be expected to be a discharge zone for the surficial aquifer. In the area of Wallops Island, the ocean is the ultimate discharge point for the Yorktown Aquifer. A small percentage of Yorktown Aquifer groundwater will migrate through the confining layers to lower or upper aquifers; the majority of groundwater will flow laterally through the aquifer (USGS 2009).

The groundwater is likely to be tidally influenced; some local changes in the direction of flow would be expected throughout the tidal cycle.

## 5.2 Chemical and Physical Properties of Contaminants

The principal chemical and physical properties that impact the fate and transport of contaminants in the environment include solubility (dissolution), sorption, volatilization, advection, and dispersion as well as degradation processes, such as biodegradation, photolysis, and hydrolysis. These processes are described below.

### 5.2.1 Dissolution

Dissolution is the partitioning of a chemical in the liquid phase. Water solubility is the maximum concentration of a chemical or compound that dissolves in a given amount of pure water at a specific temperature and pH. Highly soluble chemicals are more likely to leach from the soil and waste into the groundwater and from sediment into pore water and surface water and biodegrade. Inorganic contaminants may be found in various forms, such as carbonates and sulfates. These compounds may have a variety of solubilities.

### 5.2.2 Sorption

Sorption is the tendency for contaminants to adsorb to materials in the environment. The amount of sorption that will take place is a function of the chemical properties of the contaminant and the properties of the media through which the contaminant is moving. Many contaminants tend to adsorb to organic carbon; thus, the tendency of a contaminant to adsorb can be indicated by the log of the organic carbon partition coefficient, $K_{oc}$, of that chemical. $K_{oc}$ is the ratio of the adsorbed chemical per unit weight of organic carbon to the aqueous solute concentration.

A low $K_{oc}$ (e.g., 10) suggests there is a weak potential for the chemical to leach into groundwater or surface water, whereas a high $K_{oc}$ (e.g., 10,000) indicates the chemical will strongly adsorb to the available organic carbon. Generally, the stronger a chemical is adsorbed, the lower the water solubility. Log $K_{oc}$ ranges and the ability to adsorb to soil are presented below (Agency for Toxic Substances and Disease Registry 1999).

The tendency of metals to adsorb to environmental media is controlled not only by the organic carbon in the media but also by the pH, the cation exchange capacity of the soils, and other site-specific factors.

| Log $K_{oc}$ | Sorption to soil/sediment |
|---|---|
| <1 | Very weakly sorbed |
| 1 to 2 | Weakly sorbed |
| 2 to 3 | Moderately sorbed |
| 3 to 4 | Moderately to strongly sorbed |
| 4 to 5 | Strongly sorbed |
| >5 | Very strongly sorbed |

As a contaminant moves through an aquifer, it will be slowed by its tendency to sorb and the presence of organic material. The degree to which it is slowed is expressed as a retardation factor, which can be calculated if the $K_{oc}$ is known.

### 5.2.3 Volatilization

Vapor pressure is a relative measure of the volatility of the compound in its pure state and is an important factor in the rate of volatilization from contaminated soils and surface water to the atmosphere. Volatilization rates are also affected by site-specific conditions, such as temperature, wind speed, and soil conditions. Chemicals with a relatively low vapor pressure and a high affinity for soil or water are less likely to vaporize and become airborne than those with a high vapor pressure and low affinity for water and soil.

A related parameter, Henry's law constant, is sometimes referred to as the air-water partition coefficient. It is the ratio of the partial pressure of a compound in air to the concentration of the chemical in water at a given temperature under equilibrium (Montgomery and Welkom 1990). When vapor pressure is high relative to water solubility, Henry's law constant is high, and the chemical volatilizes to air. If the water solubility is high relative to the vapor pressure, Henry's law constant will be low, and the chemical will tend to remain in solution. Some ranges of Henry's law constant and associated volatility are listed below.

| Henry's Law Constant | Volatility |
|---|---|
| $<3\times10^{-7}$ | Non-volatile |
| $3\times10^{-7}$ to $1\times10^{-5}$ | low |
| $1\times10^{-5}$ to $1\times10^{-3}$ | moderate |
| $>1\times10^{-3}$ | high |

### 5.2.4 Advection, Diffusion, and Dispersion

Contaminants that have reached the water table move through an aquifer via advection, diffusion, and dispersion. Advection is the movement of the contaminants with the water as it moves downgradient, forming a contaminant plume. Diffusion is the movement of contaminants in response to concentration gradients. The size of the plume can increase as the water moves through the process of dispersion. The primary mechanism for dispersion is the mechanical mixing of the contaminant as the water flow velocity changes due to variations

in pore size and shape. The effect of dispersion is a dilution in the contaminant concentration away from the source.

### 5.2.5 Biodegradation, Photolysis, Hydrolysis, and Bioaccumulation

These degradation processes transform the contaminants to another chemical.

Biodegradation is the process by which indigenous soil or sediment organisms degrade contaminants to innocuous byproducts, such as carbon dioxide and water. The four requirements for biodegradation to occur include the presence of nutrients, moisture, an electron donor, and a terminal electron acceptor. Nutrients and moisture are generally readily available in the subsurface. Therefore, the presence of electron donors or terminal electron acceptors are generally the limiting factor in biodegradation. Although no site-specific data on these factors are available, numerous studies found in the literature document theoretical and measured half-lives in soils and surface water from which generalizations concerning the tendency of a compound to degrade can be derived.

Photolysis is the process by which chemicals degrade as a result of exposure to sunlight. This process will be insignificant in groundwater but could be more significant when contaminants are discharged to the creeks or other surface water bodies where they can be exposed to sunlight.

Hydrolysis is the reaction of a compound with water resulting in a new chemical species. Hydrolysis reactions are highly pH dependent. In groundwater, these are typically too slow to be significant.

Bioaccumulation is the process by which chemicals can accumulate in an organism when the organism absorbs a substance faster than the rate at which the substance is lost by catabolism and excretion. Through bioaccumulation, contaminants can become a part of the food chain. The log of the *n*-octanol/water coefficient ($K_{ow}$) of a substance has been shown to be related to the bioaccumulation factors (BCFs) in aquatic organisms. Log $K_{ow}$ is unitless. The higher the log $K_{ow,}$ the greater the tendency of a compound to bioaccumualate. The log $K_{ow}$ of some compounds (phenols and acids, for example) are pH dependent. A log $K_{ow}$ less than 3 indicates that the compound is not likely to bioaccumulate; log $K_{ow}$ between 3 and 4 indicates a potential to bioaccumulate and a log $K_{ow}$ greater than 4 indicates the potential to significantly bioaccumulate.

## 5.3 Environmental Fate of COPCs

The various chemical and physical processes described above impact the environmental fate and transport of COPCs to different extents. The COPCs evaluated in the SFI are VOCs, SVOCs, dioxins/furans, and metals. Within each group or class of chemicals, the COPCs are impacted similarly by their chemical and physical properties. The processes that act upon these classes of compounds are discussed below. Those chemical and physical properties that are most important in the fate and transport of organic and inorganic groundwater, soil, pore water, and sediment COPCs are discussed below.

### 5.3.1 Volatile Organic Compounds

Several VOCs are COPCs and COPECs for soil, groundwater, pore water, and sediment at the Site. VOCs are generally highly mobile in the environment and highly volatile (Henry's law

constants in the range of $1.0 \times 10^{-1}$ to $9.0 \times 10^{-3}$). They do not adsorb readily to soils and have low retardation factors in groundwater, with their flow rates approximately equal to that of groundwater. A large portion of most of the VOCs, when originally released to the soil, would be expected to rapidly evaporate due to their high vapor pressure. Then, because these VOCs are moderately to highly soluble in water and do not sorb to soils, the fraction remaining in the soil would readily infiltrate through the unsaturated zone by partitioning between the liquid phase (soil moisture) and the vapor phase and leach into the groundwater. In groundwater, they would be expected to flow downgradient with little retardation. If discharged to surface water, several of these COPCs may volatilize. Some, but not all, may undergo photolysis and biodegradation. Due to their high Henry's law constants, VOCs in soil and groundwater can move from soil surfaces and groundwater into the vapor phase. Once in the vapor phase, VOCs can move through the pore spaces in soil and discharge at the ground surface to the atmosphere. The log $K_{ow}$ of VOC COCs and COPECs are below 4 and would not be expected to bioaccumulate.

The chlorinated solvent COPCs are moderately persistent in the environment. They are resistant to chemical degradation but moderately susceptible to biodegradation under anaerobic conditions. A comparison of the concentration of PCE and cis-1,2-DCE in groundwater from MW-4 in 2007 to the concentration in 2016 is shown in **Table 5-1**. All samples and duplicates are shown on this table. Generally, concentrations of PCE in 2007 (7.9 to 13.9 µg/l) decreased to a range of non-detect to 3.8 J µg/l in 2016. Concentrations of cis-1,2-DCE (a daughter product of dichlorination of PCE and TCE) decreased from 45.4 to 54.5 µg/l in 2007 to a range of non-detect to 22 J µg/l in 2016. Cis-1,2-DCE can be used as a solvent although it has not been used extensively in industry. It is also used as an intermediary in the manufacture of other chemicals. However, the presence of cis-1,2-DCE at concentrations greater than PCE in 2007 may indicate that biodegradation of PCE (a more commonly used solvent and therefore more likely to have been disposed in the waste) had already been occurring for some time prior to 2007. The decrease in cis-1,2-DCE concentrations from 2007 to 2016 indicates that biodegradation continued through that time. Vinyl chloride, a breakdown product of cis-1,2-DCE through anaerobic biodegradation, has not been detected in MW-4.

Petroleum hydrocarbons, such as BTEX components, can be degraded under both aerobic and anaerobic conditions. The rate of degradation for the individual components of BTEX is site-dependent. Although benzene is present in high concentrations in the waste and stained soil areas of the Central AOC, it was only detected at relatively low concentrations (3.7 µg/l) once in MW-5 (May 2007); it was not detected in MW-5 in either 2016 sample. Therefore, a comparison of benzene concentrations through time is not possible. Ethylbenzene, toluene, and total xylene were detected in both 2007 and 2016 in MW-4. Concentrations of ethylbenzene (389 to 548 µg/l in 2007 and 430 to 600 µg/l in 2016) and xylene (1,900 to 3,040 µg/l in 2007 and 2,500 to 3,500 µg/l in 2016) do not indicate a decrease and may be indicative of a slight increase. Concentrations of toluene in MW-4, however, decreased markedly from 1,220 to 1,680 µg/l in 2007 to 540 J to 670 J µg/l in 2016.

Cycloalkanes (cyclohexane and methylcyclohexane) are not easily biodegraded. Concentrations of these compounds in MW-4 stayed the same or increased. Cyclohexane ranged from 128 to 216 µg/l in 2007 and from 180 to 330 µg/l in 2016); methylcyclohexane was found at concentrations of 105 to 180 µg/l in 2007 and from 99 to 210 µg/l in 2016.

The site-related VOC detected in the porewater, PCE, has a log $K_{ow}$ of 3.4 but was detected below the BTAG screening value. The only site-related VOC detected in SFI sediment samples, carbon tetrachloride, has a log $K_{ow}$ of 2.8 and is unlikely to bio accumulate.

### 5.3.2 Semi-volatile Organic Compounds

Several PAHs are site COPCs for soil and groundwater. Typically, PAHs adsorb readily to organic material and fine particles in soil, and most have very low solubility. When released to soil, these compounds will adhere to the soil particles and may be transported through surface runoff to sediment in water bodies. A small percentage may dissolve and percolate to groundwater.

Naphthalene and 2-methylnaphthalene are significantly more soluble than the other PAHs. While most of the PAHs are moderately to strongly adsorbed to organic carbon, naphthalene is moderately adsorbed (Log $K_{oc}$ of 2.74). Similarly, while most of the PAHs have a log $K_{ow}$ greater than 4, indicating a likely tendency to bioaccumulate, naphthalene and 2-methylnaphthalene have log $K_{ow}$s between 3 and 4.

At the Site, high levels of SVOCs, particularly PAHs, were found in soil samples (See TP-11C, TP-12C, TP-24A, and TP-26B). Relatively low levels of dissolved PAHs were found in groundwater samples in some adjacent temporary wells (e.g., DPW-1). In other close-by temporary wells, only the most soluble of PAHs, naphthalene, was found at concentrations above RSLs (e.g., DPW-2, DPW-3, and DPW-4). As would be expected based on their relatively higher solubilities compared to the other SVOCs, naphthalene, 2-methylpahthalene, and 1,1-biphenyl were the only SVOCs that were found in MW-4, downgradient of the Central AOC shallow surficial aquifer groundwater contamination.

The only SVOC detected in SFI sediment samples, the PAH fluoranthene, was found at the SD-16 location, at the discharge point of the drainage feature that runs northeast from the Southern AOC. PAHs were found in surface soil in the Southern AOC during the RI (no surface soil samples were collected in the SFI). Although PAHs are common in soil and sediment in the environment due to industrialization, the presence of a PAH at the surface drainage discharge point (and no other locations) suggests that PAHs adsorbed to soil particles or organic matter in the surface soil of the Southern AOC may have migrated via overland flow of surface runoff during periods of heavy precipitation to the drainage ditch and, subsequently, to the tidal creek.

### 5.3.3 Dioxins/Furans

Dioxin congeners are a COPC for groundwater and a COPEC for sediment. EPA's exposure and human health reassessment of 2,3,7,8-TCDD and related compounds (2003) summarizes important fate and transport properties for dioxins and furans. These properties include water solubility, vapor pressure, octanol/water partition coefficient, organic carbon partition coefficient, and photochemical quantum yield. The values identified by EPA were based on a thorough search of the literature for dioxins and furans.

Dioxins and furans are nearly insoluble in water. The solubilities of individual congeners range from $7.4\times10^{-8}$ mg/l (low end of the range for OCDD) to $4.2\times10^{-4}$ mg/l (tetrachlorodibenzofuran [TCDF]). Because of their non- to low-soluble characteristics, these chemicals bind to soil and do not leach significantly into underlying groundwater.

Dioxins and furans have low vapor pressures, indicating they are not volatile. Average Henry's law constants for dioxin and furan congener groups range from $1.88\times10^{-6}$ (OCDF) to $1.7\times10^{-5}$ (TCDD) atm-$m^3$/mol, which indicates they are unlikely to volatilize from water.

Although average $K_{oc}$ values are not provided by EPA (2003) for all congener groups, the $K_{oc}$ values for dioxins and furans are high, with log ($K_{oc}$) values for OCDD (the congener most frequently detected in site media and detected at the highest concentrations) and OCDF, ranging from 5.92 to 7.90. These high $K_{oc}$ values indicate that dioxins and furans will very strongly adsorb to soil. Dioxin/Furan congeners that are adsorbed to soil particles can be transported via surface runoff and on particles suspended in moving surface water.

Dioxins and furans are extremely stable under most environmental conditions. The only significant transformation processes for dioxins and furans are atmospheric photooxidation and photolysis of species that are not adsorbed to soil. Once adsorbed to soil, dioxins and furans demonstrate no significant leaching or volatilization.

Although no shallow soils were collected and analyzed for dioxins/furans in the RI or SFI, the highest concentrations of dioxin TEQ (ND=0) were found near the discharge of the drainage feature that runs northeast from the Southern AOC (at SD-16). Other elevated dioxin TEQ concentrations were found downgradient of the discharge point of the southern drainage (SD-19 and SD-21). If dioxins/furans were present in the surface soils at the Southern AOC, similar to the migration of SVOCs, dioxins/furans adsorbed to fine soil particles or organic matter could have been washed via overland flow during periods of heavy precipitation to the drainage ditch and into the tidal creek.

The log $K_{ow}$ of both of the most frequently detected congeners of dioxin/furan (OCCD and 1,2,3,4,6,7,8-HpCDD) is greater than 4 and would be expected to bioaccumulate.

### 5.3.4 Metals

Except for total mercury, the metal COPCs and COPECs will not volatilize or biodegrade. Generally, the metals can form hydroxides and oxides of various solubilities, but most also strongly adsorb to clays, iron or other metals, and organic matter. Due to their tendency to adsorb to soil and sediment, these compounds may be transported via surface runoff to sediment and surface water on particles to which they have adsorbed. The transport of these contaminants in sediment will largely be dependent on the movement of the sediment particles to which they are adsorbed.

A variety of factors affects the mobility of metals in the subsurface, including:

- the presence of water (soil moisture content)
- the presence of other complexing chemicals in solution
- the pH and ORP, which affect the speciation of all inorganics and complexing agents
- the temperature
- soil properties, such as cation exchange, the presence of hydrous oxides of iron and magnesium, and the presence of organic matter

Dissolved metals will be transported in groundwater; however, the solubility of inorganics is variable because their solubility is highly dependent upon redox conditions and pH. If these conditions change along a flow path, dissolved metals can transform chemically and precipitate out of solution.

Because of the wide range of soil conditions in the environment and the resulting high variability of certain physical parameters, it is difficult to predict the mobility of inorganics. Soil

sorption constants may vary over several orders of magnitude for a given inorganic in different soils and/or under different environmental conditions. Thus, there is no single sorption constant describing the binding of inorganics in solution to soils, and no one mobility prediction holds for all environmental conditions.

The persistence of metals will depend on the rates of leaching, amount of rainfall, and individual metal properties. Inorganic persistence is complicated by processes, such as precipitation and dissolution, which are dependent upon pH, the presence of certain ions or complexing agents, and concentrations of the inorganics in solution.

The highest concentrations of all the metal COPECs identified in the ERA addendum (Appendix G) were detected in SD-19. It is likely that elevated concentrations of metals at this location are due to adsorption of the metals to soil particles that travel, like SVOCs and dioxins/furans, from the surface soil via overland flow during heavy precipitation to the drainage ditch. Once in the drainage ditch, metals would flow to the tidal creek. Mercury found in surface soil in the Southern AOC in the RI may also have migrated via surface runoff to the sediments of the marsh downgradient of the drainage channel. . Some forms of metals can bioaccumulate.

## 5.4 Conceptual Site Model

The CSM is intended to integrate the different types of information collected during the RI and SFI in order to present a coherent theory of contaminant migration through the various site media. Information includes site history, geology, hydrogeology, fate and transport characteristics of site-related contamination, and natural fate and transport properties that are present and active at the Site.

The CSM is represented graphically on **Figure 5-1.** The CSM figure is not a scale representation of the Site; rather, it depicts the conditions present at the Site and highlights the processes that control migration of COPCs and COPECs.

The site-related sources of the COPCs and COPECs include various waste materials (metal, plastic, glass, and paint and other undetermined pastes); a petroleum fuel, likely JP-5 (based on petroleum fingerprinting analyses done during previous studies); and other petroleum wastes. JP-5 is a kerosene-based jet fuel consisting of a mixture of hydrocarbons. The presence of two or even three source materials for the stained soil is evidenced by the presence of the two, seemingly unconnected, areas of stained soil and different observed patterns of contamination within the areas of stained soil. VOC and SVOC COPCs were both found in TP-11C and TP-11B, TP-24A, and DPT-1 (the northern lobe of staining). Only VOC COPCs (no SVOC COPCs) were detected in TP-13B and TP-13C (the southern lobe of staining), and only SVOCs COPCs (no VOC COPCs) were detected in soil from TP-26 (also in the northern lobe).

The wastes were disposed in low areas along the marsh edge, excavations, or both. Subsequently, the waste was covered with natural materials (sand) and the surface graded. In at least one location, petroleum fuel was disposed or spilled onto the sand fill. Fuel released into the soil (sand fill) will infiltrate downward through the underlying sand fill, waste (if present), and natural sands.

The density of JP-5 is less than water; therefore, when pure fuel encountered the water table, most of the mass would have floated. However, a small percentage would dissolve, releasing BTEX, cyclohexane methylcyclohexane, and other constituents into the shallow surficial aquifer. At the water table, floating fuel would spread laterally. The area of stained soil (fuel contamination) extends and thins to the southwest from the area of apparent discharge (TP-24).

Some of the mass would adsorb to soil particles or fill pore spaces in the unsaturated zone as the water table moved up or down in response to tides, seasonal fluctuations, and longer-term sea level rise.

Contaminants can also enter the groundwater as precipitation infiltrates through the debris waste and petroleum wastes and leach constituents from the waste material or from fuel that is filling pore spaces or adhering to soil particles in the unsaturated zone. Dissolved contaminants may travel with the precipitation to the water table.

In the groundwater, dissolved contaminants would travel through advection, diffusion, and dispersion. Contaminants moving with advection (with groundwater flow) would be expected to move northeast and discharge to the sediment pore water or the tidal channel. However, significant detections of the most mobile of the contaminants, the VOCs, have not been found in the pore water or the surface water, indicating that the contamination is not moving significantly. In addition, concentrations of the least biodegradable of the VOC contaminants, cyclohexane, have remained nearly the same for about 9 years although a slight increase in the concentrations in MW-4 may indicate that an area of higher concentration is migrating toward MW-4.

The low levels of contaminants found in the deep surficial aquifer are most likely present because of diffusion (concentration gradients) or dispersion. Based on the text and figure in Simulation of Groundwater Level and Salinity Changes in the Eastern Shore, Virginia. (USGS 2009), in the area immediately adjacent to the marsh, hydraulic vertical gradients would be expected to be upward; therefore, contaminants in the deep surficial aquifer are not likely to be present due to advection. The presence of toluene in DTW-4 is anomalous as it is not associated with shallow surficial aquifer contamination in the area of DTW-4.

The presence of active biodegradation in the aquifer is indicated by the decrease in cis-1,2-DCE from 2007 to 2016 and the negative ORP, indicating a reducing environment favorable to reductive dichlorination. The concentration of toluene in MW-4 has also decreased significantly, whereas ethylbenzene and xylene concentrations remain the same or slightly increase. In a study of attenuation rates of BTEX components under anaerobic conditions, Bruce et. al (2010) found that attenuation rates for the different components of BTEX varied, but ratios of attenuation rates of the various components to each other remained constant across different sites. Consistent with observations at the CDL, the study found that toluene concentrations attenuate the fastest. The study concluded that attenuation of benzene, ethylbenzene, and xylene were occurring but at slower rates than for toluene. At the Project 15 CDL Site, this means that concentrations of benzene, ethylbenzene, and xylenes that appear stable or increasing likely are indicative of higher concentrations approaching the measuring point (MW-4) and undergoing degradation (i.e., attenuation of benzene,

ethylbenzene, and xylene is occurring at the same rate or slightly slower than the increase in concentrations arriving at MW-4).

The relatively high Henry's law constants of site VOC COPCs indicate that they may volatilize from the groundwater into the soil pore space in the unsaturated zone. Once in the soil pore space, VOCs can migrate upward through the soil and discharge to the atmosphere at the ground surface.

SVOCs do not biodegrade as easily as VOCs and generally have lower solubility and higher $K_{ow}$ than VOCs. SVOCs released to the environment will be less likely to dissolve and will tend to adsorb to organic material and soil particles. Generally, the high levels of SVOCs, particularly PAHs found in soil samples in the Central AOC, were only found in groundwater immediately adjacent to the contaminated soils. Only the most soluble (naphthalene, 2-methylpahthalene, and 1,1-biphenyl) were detected in the downgradient monitoring well (MW-4). SVOCs dissolved in groundwater and discharged to the marsh would be expected to adsorb to the high TOC content marsh sediments. The three SVOCs detected in elevated concentrations in MW-4 were not detected in SFI marsh sediment or pore water samples. It is likely that SVOCs in dissolved groundwater are adsorbed to organic material or fine soil particles in the marsh sediments before they reach the shallow pore water.

SVOCs, dioxins/furans, and metals tend to adsorb to fine-grained soil and organic material. Contaminants adsorbed to soil particles on the ground surface can mobilize via surface water runoff from contaminated areas to low lying areas. Thus, contaminants can move from exposed waste and contaminated soil via surface runoff to the marsh. This mechanism for the migration of contaminants is present at the Site as evidenced by the highest concentrations of dioxins/furans and COPEC metals in sediment at, or downgradient of, the discharge points of site drainage ditches. The only PAH found in sediment (fluoranthene) was also found at the discharge point of a drainage ditch (SD-16). Some of these organic and inorganic contaminants have the potential to bioaccumulate.

If contaminated soil particles reach the surface water of the tidal channel, they would move with the direction of flow in the channel until settling through the water column. The water flow in the channel adjacent to the Site is tidal; thus, it reverses direction twice per day.

The Site is located in a low-lying coastal area immediately adjacent to tidal surface water. The waste, in some areas is visible at the water's edge. These wastes, as well as contaminated soil, are susceptible to erosion from storm events, wind, and tides. Waste and contaminated soil particles eroded from the eastern edge of wastes can be expected to flow suspended in ebbing tides and receding storm water. These particles can become entrained in the marsh vegetation and settle out in the marsh sediment.

In addition, future sea level rise will potentially increase the amount of waste that is submerged, as well as the height of waves impacting the shoreline. Flooding and storm runoff could also erode and mobilize petroleum-contaminated soil from areas where petroleum products were discharged at the surface. Contaminated soil particles suspended during flooding may be deposited in the marsh or could travel, suspended, along the drainage channels to the creek channel.

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# 6. Summary of Risk Assessment Addenda

## 6.1 Human Health Risk Assessment Addendum Summary

The Revised HHRA presents a site-specific, quantitative analysis of the Site under current and future land use scenarios based on the nature of the chemicals of potential concern (COPC) detected in environmental media, potential exposure pathways to human receptors, and the degree to which these exposures may pose adverse health effects. The Revised HHRA uses all historical data (collected in 2007 for the Remedial Investigation [RI]) and recently collected Site data (collected in between May 2015 and November 2017 for the SFI), which includes soil, sediment, surface water, and groundwater data. Results of the Revised HHRA will be used to assess potential risk to site receptors.

A quantitative HHRA was completed at the Site to evaluate risks to human health potentially posed by COPCs in the affected media beneath and within the vicinity of the Site that cannot be eliminated using screening criteria. The Revised HHRA is compliant with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, as amended by the Superfund Amendments and Reauthorization Act of 1986, and the Virginia Department of Environmental Quality (VDEQ) risk assessment guidance. The HHRA also follows the U.S. Environmental Protection Agency (EPA) “Risk Assessment Guidance for Superfund (RAGS)” Part A (1989) and subsequent RAGS guidance, which stipulates that a risk assessment addresses the following major steps:

- Data Evaluation: A description of the data handling of each exposure medium and the exposure areas evaluated in the HHRA.
- Identification of COPCs: An identification of the COPCs for each exposure medium regarding human health effects.
- Exposure Assessment: An identification of the human receptors and the potential extent of their exposure to site-related COPCs in affected media.
- Toxicity Assessment: A description of the relationship between the magnitude of exposure (intake, dermally absorbed dose [DAD], or exposure concentration [EC]) and the incidence of adverse health effects associated with the identified COPCs.
- Risk Characterization: A description of the nature and magnitude of potential human health risks, comparison to state and federal target risk levels, and discussion of the uncertainties associated with the risk evaluation.

The Revised HHRA addressed the following exposure media: surface soil (0 to 2 feet below ground surface [bgs]), subsurface soil (2  feet bgs and greater), groundwater (from wells located downgradient of the CDL Site and from upgradient potable well TOC well 06), sediment, and surface water from the adjacent Little Mosquito Creek. Future excavation activities could result in the subsurface soil being brought to the surface and “mixed” together. Therefore, a total soil data set (surface and subsurface data combined) was derived for the surface soil and/or subsurface soil COPCs, assuming future land re-development occurs. Based on the historical aerial photographic analysis (U.S. Army Topographic Engineering Center 2000), four areas of concern (AOCs) within the CDL Site were defined and named with respect to their geographic position to each other: Northern, Central, Southern, and Western AOCs. For the Revised HHRA, soil media was divided

into two different exposure areas: Central/Southern (C/S) and Northern/ Western (N/W). The Western and Northern AOCs were evaluated together because site investigations did not indicate the presence of buried waste. The Central and Southern AOCs were evaluated together because the buried waste was present as observed during site investigations.

The following potential current and future land use scenarios and exposure pathways were addressed in the Revised HHRA:

Current/future outdoor maintenance worker: direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), inhalation of vapors migrating from groundwater to outdoor air, and incidental ingestion and dermal contact with sediment in the upgradient drainage area.

Current/future teen trespasser: direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), incidental ingestion and dermal contact with surface water, and incidental ingestion and dermal contact with sediment. Even though the teen trespasser may go fishing or crabbing, the consumption of fish or crab tissue is likely to be infrequent and is not evaluated in this revised HHRA. The consumption of fish and crab tissue exposure pathway is evaluated under the outdoor recreator (child/adult) scenario and is considered protective of the teen trespasser.

Current/future outdoor recreator (child/adult): direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), incidental ingestion and dermal contact with surface water, ingestion of fish in surface water, incidental ingestion and dermal contact with sediment, and ingestion of Blue Crab in sediment.

Future indoor/outdoor commercial worker: direct contact with the total soil media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), and inhalation of vapors migrating from groundwater to outdoor air, and vapor intrusion (VI) to indoor air.

Future construction worker: direct contact with the total soil media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors) and direct contact with the groundwater media (i.e., incidental ingestion, dermal contact and inhalation of vapors in a trench).

Future hypothetical resident (child/adult): for the soil exposure areas, the following exposure pathways are evaluated - direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), and inhalation of vapors migrating from groundwater to outdoor air. For the site-wide exposure area, the following surficial groundwater aquifer exposure pathways are evaluated - direct contact with the groundwater media (i.e., incidental ingestion, dermal contact and inhalation of vapors while showering or bathing), inhalation of vapors migrating from groundwater to outdoor air, and VI to indoor air.

Off-site current/future resident (child/adult): direct contact with the groundwater media from the Yorktown Aquifer (i.e., incidental ingestion, dermal contact and inhalation of vapors while showering or bathing). The VI exposure pathway is not evaluated for the Yorktown Aquifer due to its deep depth (roughly 154 feet bgs).

Various state and federal regulatory agencies mandate target or "acceptable" carcinogenic risk and noncarcinogenic hazard levels. The VDEQ regulations establish a target cumulative risk level (i.e., from all pathways for a single receptor group) of $1\times10^{-4}$ (1E-04) for potential excess lifetime cancer risk (ELCR). The EPA identifies the acceptable cancer risk range to be $1\times10^{-4}$ to $1\times10^{-6}$ (1E-04 to 1E-06). In effect, estimated ELCR that are less than $1\times10^{-6}$ (1E-06) are generally considered negligible. Potential ELCR in the intermediate range between $1\times10^{-4}$ to $1\times10^{-6}$ (1E-04 to 1E-06) can be considered acceptable on a case-by-case basis. The cancer risk of $1\times10^{-6}$ is used as the risk goal for individual carcinogens, with a not-to-exceed ELCR of $1\times10^{-4}$ for all carcinogens. Both the VDEQ and EPA accept a cumulative noncarcinogenic hazard target level, or Hazard Index (HI), of 1. When an HI is above 1 for a receptor, the chemical non-hazard hazard quotients (HQs) are segregated based on the target organ endpoint, and separate target organ-specific HIs are calculated. Only chemicals that act upon the same target organ are expected to be additive.

For each exposure scenario (i.e., receptor and exposure area) with a potential ELCR/HI above the EPA target levels, chemicals of concern (COCs) were identified as COPCs that contributed to the cumulative ELCR to exceed 1E-04 and/or the target organ endpoint HI to exceed 1, at one significant figure.

The Revised HHRA evaluated reasonable maximum exposure (RME) and central tendency exposure (CTE) for each receptor. The RME scenario is intended to assess the highest exposure that is reasonably expected to occur at a site. The CTE scenario refers to individuals who have average or typical intake of exposure media.

**Tables 6-1 and 6-2** summarize the RME and CTE cancer and non-cancer hazard results, respectively. **Table 6-3** presents the carcinogenic COCs that are contributing to unacceptable ELCR results for each receptor and exposure area. **Table 6-4** presents the noncarcinogenic COCs that are contributing to unacceptable target organ-specific HI results for each receptor and exposure area. The RME and CTE results for the Upgradient Drainage and Downgradient/Estuarine exposure areas are below the EPA cumulative ELCR and HI target levels and are eliminated from further evaluation in the Revised HHRA. The carcinogenic and/or noncarcinogenic results for some receptors at the Central/Southern, and Northern/Western exposure areas either equaled or were above EPA target cumulative levels and are discussed further below.

**Central/Southern Exposure Area Cancer Risk Results:**

As shown in **Table 6-3**, the Central/Southern exposure area RME carcinogenic COCs for the current and future lifetime outdoor recreator, future indoor/outdoor commercial worker, and future hypothetical resident scenarios are primarily metals (arsenic and chromium); PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene); dioxins and furans (i.e., 2,3,7,8-TCDD TEQ); and VOCs (1,1,2-trichloroethane, 1,2-dichloroethane, benzene, chloroform, ethylbenzene, and

trichloroethene) in groundwater and surface and total soil. These results assume that groundwater is used for potable purposes even though the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

The Central/Southern exposure area RME and CTE evaluation indicates that the cumulative ELCR results drop from 6E-04 to 1E-04, respectively, for the current lifetime outdoor recreator scenario (**Tables 6-1 and 6-2**). As shown in **Table 6-3**, the RME evaluation identified metals (arsenic and chromium), PAHs (benzo(a)pyrene and dibenz(a,h)anthracene), and dioxins and furans (2,3,7,8-TCDD TEQ) as soil COCs. However, only chromium in surface soil remains as a COC in the CTE evaluation.

The future lifetime outdoor recreator scenario cumulative RME ELCR results are 3E-04 with the addition of VOC 1,1,2-trichloroethane and PAHs (benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene) as soil COCs, but the ELCR drops below the EPA cumulative target ELCR of 1E-04 in the CTE evaluation.

For the future indoor/outdoor commercial worker scenario, the RME evaluation identified metals (arsenic and chromium); PAHs (benzo(a)pyrene and naphthalene); and VOC 1,1,2-trichloroethane as soil COCs. For groundwater, VOCs (1,2-dichloroethane, benzene, and ethylbenzene) were identified as VI COCs. The cumulative RME ELCR results drop from 4E-04 to below the EPA cumulative target ELCR of 1E-04 with 6E-05 in the CTE evaluation (i.e., no soil or groundwater COCs).

For the future lifetime resident scenario, the RME evaluation identified metals (arsenic and chromium); PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (benzene,1,2-dichloroethane, ethylbenzene, 1,1,2-trichloroethane, and trichloroethene) as soil and/or groundwater COCs. The cumulative RME ELCR results drop from 3E-03 to CTE ELCR of 2E-03; the VOCs 1,1,2-trichloroethane and trichloroethene, and PAH dibenz(a,h)anthracene are no longer identified as carcinogenic COCs for soil in the CTE evaluation.

**Central/Southern Exposure Area Non-Cancer Hazard Results:**

As shown in **Table 6-4**, the Central/Southern exposure area RME noncarcinogenic COCs for the future outdoor worker, child outdoor recreator, indoor/outdoor commercial worker, and child and adult resident are primarily metals (aluminum, antimony, arsenic, beryllium, copper, cobalt, iron, manganese, mercury, nickel, thallium, and vanadium); PAHs (benzo(a)pyrene, 2-methylnaphthalene, and naphthalene); and VOCs (benzene, 1,1'-biphenyl, 1,1,2-trichloroethane, 1,2-dichloroethane, 2-hexanone, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, trichloroethene, toluene, and xylenes).

The future outdoor worker cumulative HI is 3 for both the RME and CTE results (**Tables 6-1 and 6-2**) due to inhalation of 1,1,2-trichloroethane vapors in total soil.

The current and future child outdoor recreator RME cumulative HI results were above the target HI of 1 due to direct contact with antimony, copper, iron, and nickel in soils. The CTE cumulative HI results for the child outdoor recreator drop below the EPA cumulative target HI of 1 and metals are no longer identified as noncarcinogenic soil COCs.

The future indoor/outdoor commercial worker RME cumulative HI of 11 drops to 5 for the CTE cumulative HI; however, both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified benzene, naphthalene, toluene, trichloroethene, and xylenes as groundwater VI COCs and 1,1,2-trichloroethane was identified as an inhalation of vapors from soil COC. Trichloroethene and toluene drop out as groundwater COCs for the CTE evaluation.

The future construction worker RME cumulative HI of 16 drops to 7 for the CTE cumulative HI; however, both results remain above the EPA cumulative target HI of 1. The RME evaluation identified benzene, isopropylbenzene, mercury, naphthalene, toluene, and xylenes as groundwater COCs; 1,1,2-trichloroethane was identified as an inhalation of vapors from soil COC. However, 1,1,2-trichloroethane, toluene, manganese, mercury, and xylenes drop out as COCs for the CTE evaluation.

The future child resident RME cumulative HI of 75 drops to 42 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified the following COCs in soil and/or groundwater (**Table 6-4**): metals (aluminum, arsenic, cadmium, cobalt, copper, iron, manganese, mercury, thallium, and vanadium); PAHs (2-methylnaphthalene, benzo(a)pyrene, and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (1,1,2-trichloroethane, 1,1'-biphenyl,1,2-dichloroethane, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, toluene, trichloroethene, and xylenes). However, 1,1'-biphenyl, cis-1,2-dichloroethene, cadmium, cobalt, isopropylbenzene, 2,3,7,8-TCDD TEQ, and vanadium drop out as COCs for the CTE evaluation.

The future adult resident RME cumulative HI of 57 drops to 43 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified similar COCs as the child resident (**Table 6-4**). However, 1,1'-biphenyl, 2-methylnaphthalene, cis-1,2-dichloroethene drop out as groundwater COCs for the CTE evaluation. Even though the future child resident tends to be the more sensitive non-cancer receptor for the residential scenario, the inhalation of indoor air via VI and showering exposure pathways are contributing to the higher future adult resident RME and CTE cumulative HI results. The future child resident is not evaluated for the showering exposure pathway. As shown in **Table 6-4**, benzene and xylenes have high chemical-specific hazard quotients for the future adult resident inhalation indoor air (VI and showering) exposure pathways.

The lead evaluation using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) and Adult Lead Methodology (ALM) models identified lead as a COC for surface soil and total soil for the Central/Southern exposure area. The future outdoor maintenance worker, teen trespasser, construction worker results were above the 5% probability percent threshold for total soil indicating these receptors have greater than 5% chance of having PbB levels over 5 µg/dL. The future child resident results were also above the 5% probability thresholds for surface and total soil. Therefore, potential soil cleanup options need to be explored to prevent potential adverse effects to human health from exposure to lead in soil.

**Northern/Western Exposure Area Cancer Risk Results:**

As shown in **Table 6-3**, the Northern/Western exposure area RME carcinogenic COCs for lifetime resident are primarily metals (arsenic and chromium), PAHs (benzo(a)anthracene,

benzo(a)pyrene, and naphthalene), VOCs (1,2-dichloroethane, benzene, chloroform, ethylbenzene, and trichloroethene), and dioxins and furans (2,3,7,8-TCDD TEQ). These results assume that groundwater is used for potable purposes even though the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

For the future indoor/outdoor commercial worker scenario, the RME evaluation identified PAH naphthalene and VOCs (1,2-dichloroethane, benzene, ethylbenzene) as groundwater VI COCs. Also, chromium was identified as a direct contact with total soil COC. The cumulative RME ELCR results drop from 4E-04 to below the EPA cumulative target ELCR of 1E-04 with 6E-05 in the CTE evaluation (i.e., no soil or groundwater COCs).

For the future lifetime resident scenario, the RME evaluation identified the metal (arsenic); PAHs (benzo(a)pyrene and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (benzene,1,2-dichloroethane, and trichloroethene) as groundwater COCs. Chromium was identified as a RME total soil COC. The cumulative RME ELCR results drop from 3E-03 to a CTE ELCR of 2E-03 which is still above the EPA cumulative target ELCR of 1E-04. The CTE evaluation identified the same carcinogenic COCs as the RME evaluation.

**Northern/Western Exposure Area Non-Cancer Hazard Results:**

As shown in **Table 6-4**, the Northern/Western exposure area RME noncarcinogenic COCs for the indoor/outdoor commercial worker, construction worker, and child and adult resident are metals (aluminum, arsenic, beryllium, cobalt, iron, manganese, mercury, thallium, and vanadium); PAHs (2-methylnaphthalene and naphthalene); VOCs (benzene, 1,1'-biphenyl, 1,2-dichloroethane, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, trichloroethene, toluene, and xylenes); and dioxins and furans (2,3,7,8-TCDD TEQ).

The future indoor/outdoor commercial worker RME cumulative HI of 7 drops to 4 for the CTE cumulative HI; however, both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified VOCs benzene, naphthalene, toluene, trichloroethene, and xylenes as groundwater VI COCs. However, trichloroethene, naphthalene and toluene drop out as groundwater COCs for the CTE evaluation.

The future construction worker RME cumulative HI of 11 drops to 6 for the CTE cumulative HI; however, both results remain above the EPA cumulative target HI of 1. The RME evaluation identified the metal mercury, PAH naphthalene, and VOCs (benzene, isopropylbenzene, toluene, and xylenes) as groundwater COCs. However, isopropylbenzene, toluene, mercury, and xylenes drop out as groundwater COCs for the CTE evaluation.

The future child resident RME cumulative HI of 54 drops to 38 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified the following groundwater COCs (**Table 6-4**): metals (aluminum, arsenic, beryllium, cobalt, iron, manganese, mercury, thallium, and vanadium); PAHs (2-methylnaphthalene, benzo(a)pyrene, and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (1,1'-biphenyl,1,2-dichloroethane, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, toluene, trichloroethene, and xylenes). However, beryllium, 1,1'-biphenyl, cis-1,2-dichloroethene, cobalt, iron, isopropylbenzene, 2,3,7,8-TCDD TEQ, and vanadium drop out as groundwater COCs for the CTE evaluation.

The future adult resident RME cumulative HI of 45 drops to 42 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified similar COCs as the future child resident (**Table 6-4**). However, 1,1'-biphenyl, 2-methylnaphthalene, cis-1,2-dichloroethene drop out as groundwater COCs for the CTE evaluation. Even though the child resident tends to be the more sensitive non-cancer receptor for the residential scenario, the inhalation of indoor air via VI and showering exposure pathways are contributing to the higher adult resident cumulative HI results. The future child resident is not evaluated for the showering exposure pathway. As shown in **Table 6-4**, benzene and xylenes have high chemical-specific hazard quotients for the future adult resident inhalation indoor air (VI and showering) exposure pathways.

In conclusion, the HHRA results indicated that the receptors evaluated for the Upgradient Drainage and Downgradient/Estuarine exposure areas have cumulative ELCR and HI results below the EPA target levels and are eliminated from further evaluation.

The HHRA results indicate that unacceptable risk is possible for the following exposure areas and human receptors:

- Central/Southern exposure area – Future outdoor worker, current/future outdoor recreator (adult/child) exposure to surface and total soil; indoor/outdoor commercial worker exposure to surface and total soil and indoor vapors (VI) from surficial groundwater; future construction worker exposure to total soil, and outdoor vapors (trench) from surficial groundwater; and future hypothetical resident (child/adult) exposure to total soil and surficial groundwater (potable use, VI, and showering/bathing).
- Northern/Western – indoor/outdoor commercial worker exposure to indoor vapors (VI) from surficial groundwater; construction worker exposure to outdoor vapors (trench) from surficial groundwater; future hypothetical resident (child/adult) exposure to surficial groundwater (potable use, VI, and showering/bathing)
- Lead modeling results for the southern portion the Central/Southern exposure area indicate that the future outdoor maintenance worker, teen trespasser, and construction worker results were above the 5% probability percent threshold for total soil indicating these receptors have a greater than 5% chance of having PbB levels over 5 µg/dL. The hypothetical child resident results were also above the 5% probability thresholds for surface and total soil. Adverse health effects from exposure to lead in soil are possible.

The Revised HHRA conservatively assumed that total chromium concentrations were hexavalent chromium because chromium speciation data were not available. Hexavalent chromium is the more toxic form of chromium to human receptors. Chromium is a polyvalent element and can exist in several distinct oxidation states, but only trivalent chromium and hexavalent chromium occur with any frequency in the natural environment. Therefore, chromium cancer risk results may be overestimated.

As noted in **Tables 6-3 and 6-4**, the results of the Background Threshold Values Report (BTV Report) evaluation were incorporated in the HHRA and indicate that after COCs below BTVs are excluded it would not cause the risk results to drop below the cumulative target cancer risk level of 1E-04 or target HI of 1 for receptors that are already exceeding.

## 6.2 Ecological Risk Assessment Addendum Summary

The primary purpose of the ERA is to identify constituents of potential ecological concern (COPECs) and assess the need and the level of effort necessary to perform further evaluation of the current and future Site risk. The ERA fulfills this purpose by: (1) identifying potential ecological receptors and habitats at the Site; (2) determining which pathways are potentially complete; (3) evaluating if constituents of interest (COIs) present within complete exposure pathways have the potential to pose significant environmental risk; and (4) to determine if this potential for risk warrants additional ecological risk characterization.

The ERA was conducted in accordance with the following federal guidance:

- United States Environmental Protection Agency (USEPA). 1997. *Ecological Risk Assessment Guidance for Superfund* (ERAGS).
- USEPA. 2001. *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments.*
- USEPA. 2015a. *EPA Region 3 BTAG – Frequently Asked Questions.* September.
- USEPA. 2018. *Region 4 Ecological Risk Assessment Supplemental Guidance*.

Potential ecological exposure was evaluated under current conditions using recent analytical data collected in relevant exposure media (i.e., surface soil, sediment, surface water, and pore water). Exposures were evaluated for four source areas of concern (AOCs) and several nearby wetland areas potentially impacted by overland flow and groundwater to surface discharge.

The scope of this ERA report includes Steps 1 and 2 of the 8-step ERAGS process (also referred to as a Screening Level Ecological Risk Assessment [SLERA]). Steps 1 and 2 were used to identify COPECs in potentially affected environmental media to support a scientific management decision point (SMDP) regarding the need for further risk characterization and/or remediation. The list of COPECs was refined consistent with the initial stage of a Baseline Ecological Risk Assessment (BERA) Step 3 (referred to as Step 3a COPEC Refinement) to reduce uncertainty in the SLERA Step 1 and 2 conclusions and to refine the recommendations presented in the report by applying more realistic exposure assumptions.

Guided by an ecological conceptual site model (ECSM), a conservative screening evaluation was conducted to assess potential risks related in surface soil (soil macroinvertebrates and terrestrial wildlife) and sediment/surface water/pore water (benthic macroinvertebrates and aquatic/semi-aquatic wildlife). If COIs were detected above wildlife-specific benchmarks, dose rate models (DRMs) were prepared to assess potential adverse effects to selected ecological receptors from incidental and dietary ingestion.

After Step 2 of the SLERA, the results of the risk characterization determined the following SMDPs:

- The information is not adequate to a make a decision at this point and the ecological risk assessment continued to Step 3.
    - All Soil AOCs

        - Surface Soil – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for soil macroinvertebrates and wildlife.
    - Upgradient Drainage
        - Sediment – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for benthic macroinvertebrates and wildlife.
    - Downgradient Estuarine
        - Sediment/Surface Water/Pore Water – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for benthic macroinvertebrates and wildlife.
    - **Table 6-5** includes a summary of COPECs retained for the Step 3a COPEC Refinement within the BERA.

During BERA Step 3a, refinements were made to reduce uncertainty in both the direct contact evaluation and wildlife DRMs. The results for the refined direct contact evaluation (**Table 6-6 and 6-7)** and wildlife DRMs (**Table 6-8**) are summarized below. The results of the SLERA, BERA Step 3a COPEC refinement, and consideration of the uncertainties present in the evaluation support the following SMDPs for WFF:

- "There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk" (USEPA, 1997)
    - Northern AOC: soil macroinvertebrates and terrestrial wildlife
    - Western AOC: soil macroinvertebrates and terrestrial wildlife
    - Upgradient Drainage: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
- The information indicates a potential for adverse ecological effects
    - Central AOC: soil macroinvertebrates and terrestrial wildlife
    - Southern AOC: soil macroinvertebrates and terrestrial wildlife
    - Downgradient Estuarine: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
        - Impacts to sediment greatest within exposure area – adverse population-level effects to ecological receptors via surface water and pore water are unlikely.

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# 7. Conclusions

The SFI was performed to collect information and analytical data to allow a refinement of the remedial alternatives presented in the draft FS (Versar 2012). The primary objectives of the field investigation were:

- To determine if the lower part of the surficial aquifer was contaminated and, if so, determine if the upper Yorktown Aquifer was contaminated
- Refine the extent of the waste material at the CDL

The initial field investigation determined that dioxin congeners were present in site soil and groundwater. EPA, VDEQ, NASA and USACE determined that additional sediment samples, as well as pore water samples, should be collected to further refine the areas of sediment contamination and update the ERA to determine if additional COPECs were present. Similarly, an HHRA addendum was developed to evaluate the presence of additional COPCs and the additional risk posed to future receptors based on the additional COPCs or recent toxicity values.

The objectives of the SFI have been achieved, and the data collected will be used to complete the FS.

Although not a specific objective of the SFI, the extensive information and analytical data collected allows a refinement of the CSM.

**Vertical Extent of Groundwater Contamination**

To identify the areas of the lower surficial aquifer most likely to be contaminated, trenches were excavated, and soil from the trenches was sampled and analyzed to identify areas of heavy soil contamination. Shallow surficial aquifer temporary wells were installed and sampled in areas of heaviest soil contamination. Deep temporary wells were installed in areas where heaviest contamination was found in the shallow surficial aquifer as well as between those areas and the upper Yorktown Aquifer water supply well TOC-06.

The contamination found in the shallow parts of the surficial aquifer extends to greater depths, but is contained within the surficial aquifer. Analyses of deep surficial aquifer groundwater identified relatively low contaminant concentrations (but exceeding tap water RSLs) in DTW-1 (naphthalene), DTW-2 (dioxin TEQ and carbon disulfide), and DTW-4 (toluene). Nickel in DTW-1 was the only metal to exceed site-specific background concentrations. No detected constituents in the upper Yorktown Aquifer groundwater (TOC-06) were present at concentrations exceeding EPA RSLs or MCLs. Dioxin TEQ, based solely on detection limits (i.e., there were no dioxin or furan congeners detected; therefore, a concentration of 0.5 times the detection limit was used to calculate TEQ), exceeded the RSL.

The relatively low-concentration contamination in the deeper part of the surficial aquifer is not reaching the Yorktown Aquifer. The upper Yorktown clay that separates the surficial aquifer from the Yorktown Aquifer, and likely the upward vertical hydraulic gradients, are retarding or preventing the migration of contaminants from the surficial aquifer to the Yorktown Aquifer.

## Extent of Waste

Delineation of waste was not a primary objective of the SFI, however, in addition to identifying the areas of heaviest soil contamination, trenching and soil borings were used to delineate the edge of observed waste and document the types of debris and sources of contaminants present at the Site. There are two areas of waste: one in the Central AOC and one in the Southern AOC. In these areas, debris is generally buried under clean fill. However, along the edge of the marsh, including the area between the AOCs, waste is observed near the surface. In the Southern AOC the southern extent of waste was delineated in trench TP-27 and DPT-7 and the western extent by TP-16 TP-17.

In addition to waste, observations and soil analytical data allow the delineation of areas of petroleum-stained sand that are sources of groundwater contamination. The location, depth, and thickness of waste and zones of stained sand were used as inputs to a 3-D model. The model extrapolated the extent of both the waste and stained sand, although the western extent of stained sand is not well-defined with field observations. The 3-D model was used to calculate the volume of waste debris (7,450 cubic yards) and the volume of stained sand (8,065 cubic yards).

Generally, the stained sand was found in a zone near the water table, indicating that the disposed liquid was a light nonaqueous phase liquid that may have floated near the water table when first disposed. Previous work at the Site has identified the source of some staining as jet fuel JP-5; JP-5 has a density lighter than water. However, there are likely multiple fuels disposed at the Site as some areas of staining contain VOCs, some contain predominantly SVOCs, and some contain both VOCs and SVOCs. In addition, there are two separate areas of stained sand. No pure nonaqueous phase liquid was observed in the field. At one location, the zone of staining extended several feet above the water table, almost to ground surface, indicating that the liquid had been disposed at the ground surface. The ground surface was later graded with fill.

## HHRA Addendum

The HHRA Addendum (Appendix F of this SFI report) indicates that the receptors evaluated for the Northern/Western, Upgradient Drainage, and Downgradient/Estuarine exposure areas have cumulative ELCR and HI results below the EPA target levels and are eliminated from further evaluation.

The HHRA results indicate that unacceptable risk is possible for the following exposure areas and human receptors:

- Central/Southern exposure area - Future outdoor worker, current/future outdoor recreator (adult/child) exposure to surface and total soil; indoor/outdoor commercial worker exposure to surface and total soil and indoor vapors (VI) from surficial groundwater; construction worker exposure to surface and total soil, and outdoor vapors (trench) from surficial groundwater; and future hypothetical resident (child/adult) exposure to surface and total soil and surficial groundwater (potable use, VI, and showering/bathing).

- Northern/Western - indoor/outdoor commercial worker exposure to indoor vapors (VI) from surficial groundwater; construction worker exposure to outdoor vapors (trench) from surficial groundwater; future hypothetical resident (child/adult) exposure to surficial groundwater (potable use, VI, and showering/bathing)
- Lead modeling results for the southern portion the Central/Southern exposure area indicate that the future outdoor maintenance worker, teen trespasser, and construction worker results were above the 5% probability percent threshold for total soil indicating these receptors have a greater than 5% chance of having PbB levels over 5 µg/dL. The hypothetical child resident results were also above the 5% probability thresholds for surface and total soil. Adverse health effects from exposure to lead in soil are possible.

Once the background study for WFF is completed, the metals and PAHs will be re-evaluated to determine whether the concentrations are attributed to background/anthropogenic conditions or from site-related activities. Also, the Revised HHRA conservatively assumed that total chromium concentrations were hexavalent chromium because chromium speciation data were not available. Hexavalent chromium is the more toxic form of chromium to human receptors. Chromium is a polyvalent element and can exist in several distinct oxidation states, but only trivalent chromium and hexavalent chromium occur with any frequency in the natural environment. Chromium cancer risk results may be overestimated.

The COCs identified in the Revised HHRA will remain preliminary until the background study for WFF is completed and stakeholders have reviewed the risk assessment reports for the Site and are in agreement with the human health COCs.

**ERA Addendum**

The overall objective of this ERA is to determine whether potentially adverse ecological effects are occurring, or may occur, due to Site-related constituents in relevant media. Potential for risks were evaluated by screening in a SLERA framework that identified a limited number of COPECs. The evaluations for these COPECs were further refined in the context of BERA Step 3a of the ERAGS.

The results of the SLERA, BERA Step 3a COPEC refinement, and the consideration of the uncertainties present in the evaluation support the following conclusions:

- “There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk” (USEPA, 1997)
    - Northern AOC: soil macroinvertebrates and terrestrial wildlife
    - Western AOC: soil macroinvertebrates and terrestrial wildlife
    - Upgradient Drainage: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
- The information indicates a potential for adverse ecological effects
    - Central AOC: soil macroinvertebrates and terrestrial wildlife
    - Southern AOC: soil macroinvertebrates and terrestrial wildlife

- Downgradient Estuarine: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
    - Impacts to sediment greatest within exposure area – adverse population-level effects to ecological receptors via surface water and pore water are unlikely.

## Conceptual Site Model

The analytical data and field observations from trenches and borings allow the development of a CSM of the migration of COPCs and COPECs through the environment. **Figure 5-1** depicts the CSM graphically. Key elements of the CSM include:

- Waste and fuel are sources of contamination. When disposed on the ground surface liquid fuels infiltrated through the sand to the water table and then moved laterally, floating on the water table.
- Tidal fluctuations create a “smear zone” of fuel-stained sand at the water table.
- Contaminants leach from waste and stained sand via infiltrating precipitation and migrate to the groundwater.
- Groundwater flow is northeast and east, toward the marsh and tidal channel. The adjacent marsh and tidal waters are a regional groundwater discharge zone for the surficial aquifer.
- Contaminants in the VOC and SVOC shallow groundwater found in the Central AOC were not detected in the pore water of the marsh sediment, indicating that contaminant concentrations are attenuating before they reach the marsh sediments. Attenuation processes likely include aerobic and anaerobic degradation of VOCs, adsorption of SVOC, dioxin and metal contaminants on sediment and organic matter, and dilution via advection, diffusion, and dispersion.
- Based on the text and figure in Simulation of Groundwater Level and Salinity Changes in the Eastern Shore, Virginia. (USGS 2009), in groundwater discharge zones, there is an expected upward hydraulic gradient from the deeper upper Yorktown Aquifer to the surficial aquifer (USGS, 2009).
- The regionally extensive Yorktown clay confines the upper Yorktown Aquifer where the water supply well is screened, protecting the aquifer from the low levels of contamination found in the deep surficial aquifer.
- Volatile components of the fuel volatilize from the groundwater to air in soil pore spaces, migrate upward, and are released to the atmosphere.
- In the groundwater, anaerobic, and possibly aerobic, degradation of some contaminants has occurred as seen in the marked decrease in concentrations of cis-1,2-dichloroethene and toluene in groundwater in MW-4 between 2007 and 2016.

- Contaminants adsorbed to fine soil particles and organic material, such as metals, dioxin congeners, and SVOCs, are washed into drainage ditches via overland flow. Once in the drainage ditches, the contaminants travel with surface water flow to the ditch discharge point in the tidal channel. The highest concentrations of some metals and dioxin TEQ at, or immediately downstream from, the discharge ditches indicate that this has been an active contaminant migration pathway.
- Tidal flow will distribute contaminants that are adsorbed to fine soil particles and organic matter until they settle into the sediments. Note that wave action and flooding during severe storm events can re-mobilize contaminants adsorbed to soil and organic matter.

Conclusion

The data collected in the SFI met the objectives of the study and will provide the information required to finalize the FS.

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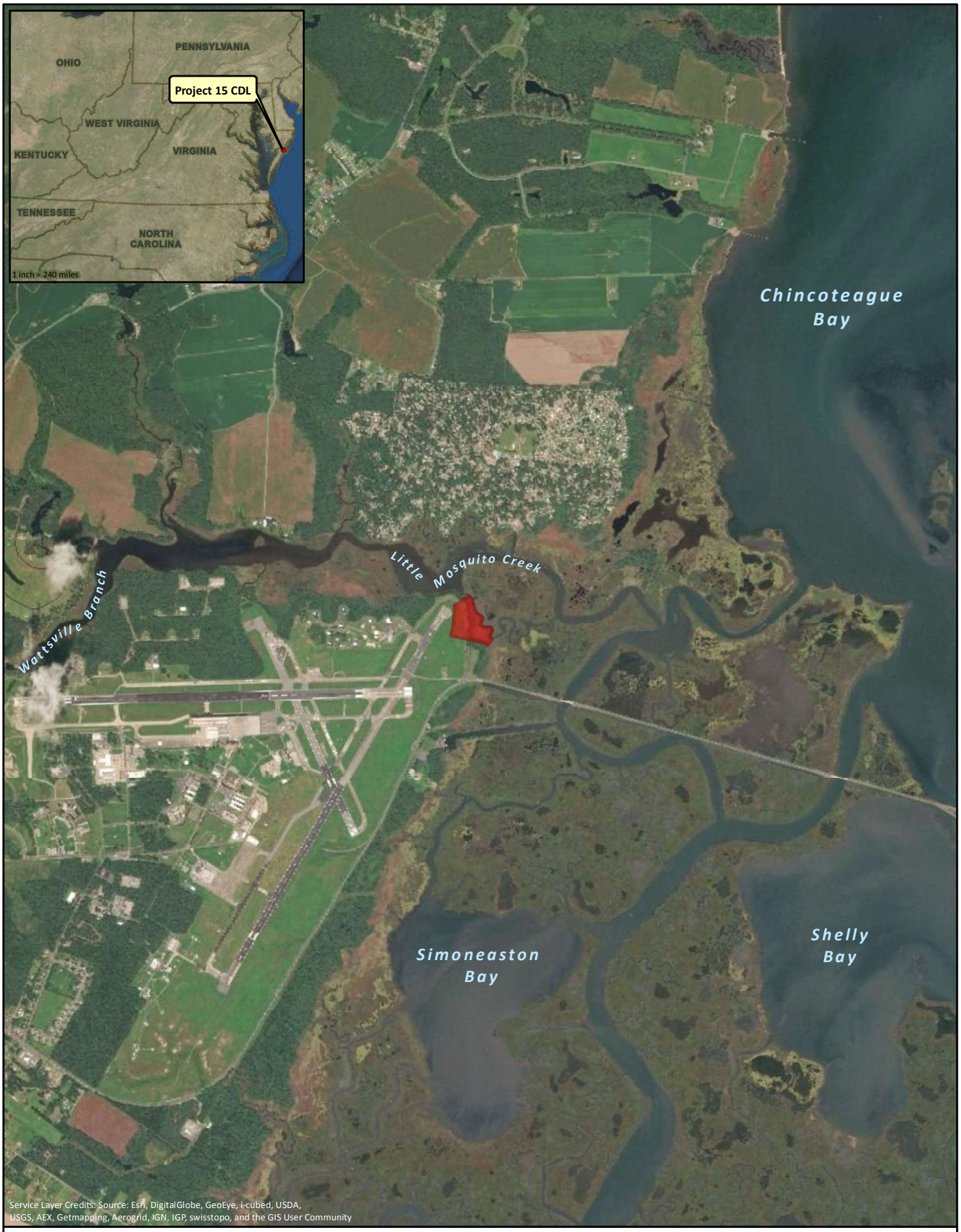
# Figures

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**Legend**

CDL Boundary

# Site Location

0 0.25 0.5 1 Miles

Project 15 CDL FS

WFF FUDS

**Figure 1-1**

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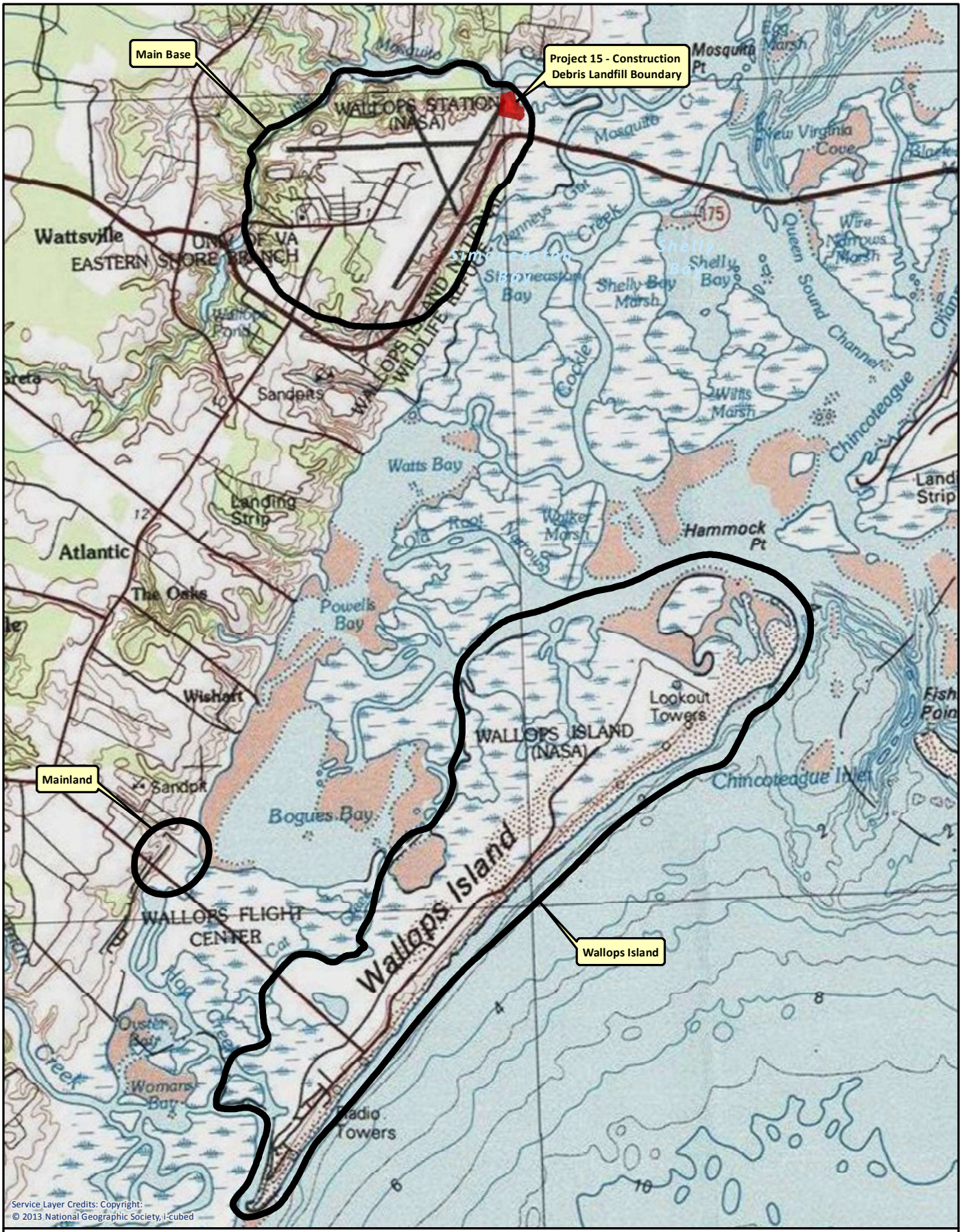


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**Legend**

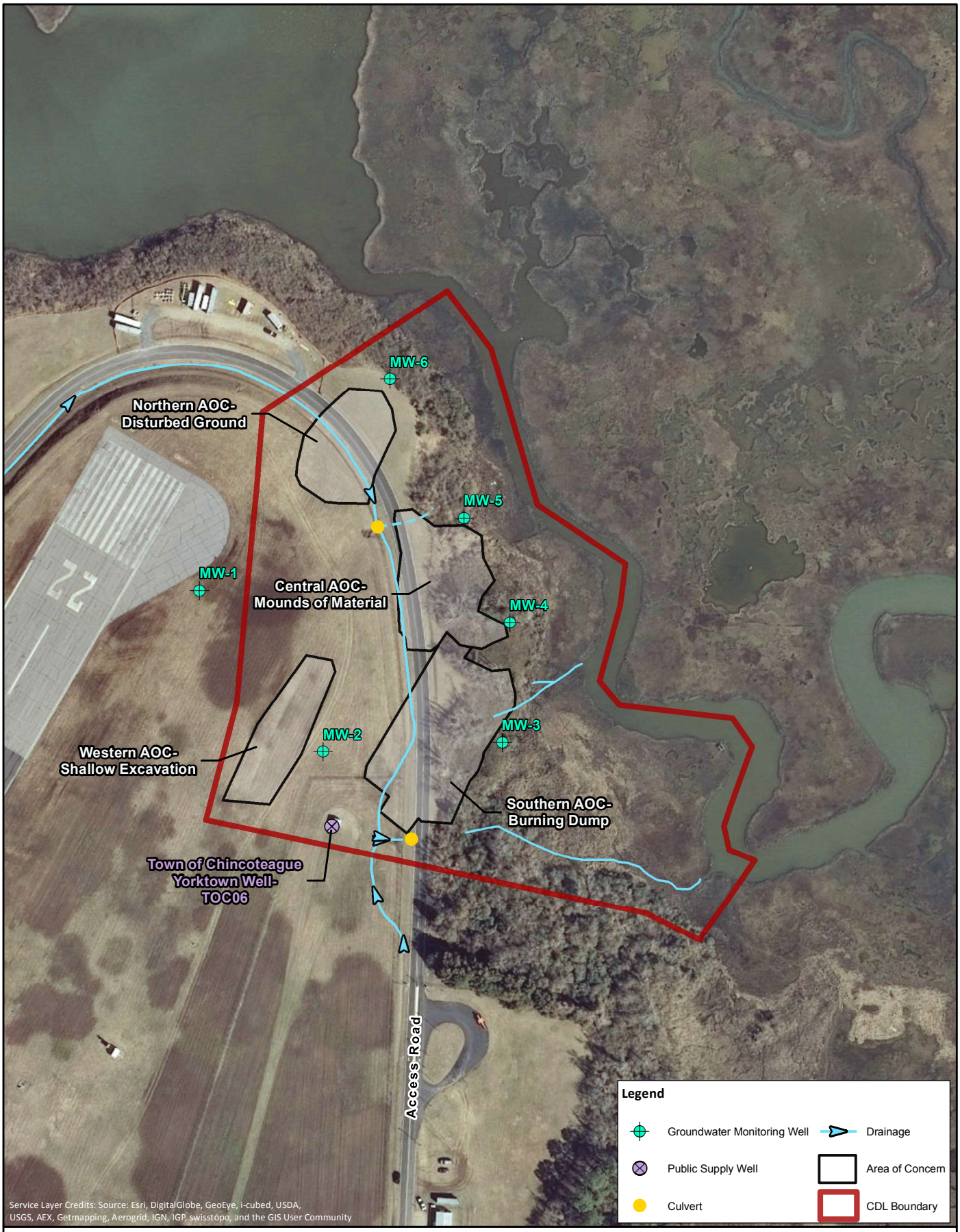
CDL Boundary

0 0.5 1 2 Miles

# Site Layout

Project 15 CDL FS
WFF FUDS

**Figure 2-1**

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# Site Features

0 100 200 400 Feet

Project 15 CDL FS
WFF FUDS

**Figure 2-2**

FarmerRA C:_projects\Wallops Island CDL\GIS\MXD\SupplementalFieldInvestigation\Figure1-2_Project15_CDL_FP_CDL_Site_Features.mxd 7/1/2018

**Figure 2-3**
**Project 15 - Construction Debris Landfill**
**Stratigraphy and Hydrostratigraphy**

<table>
<tr><th>Elevation (ft msl)</th><th>Aquifer</th><th>Geologic Zone</th></tr>
<tr><td>35</td><td rowspan="6">Vadose Zone</td><td rowspan="5">Pleistocene Deposits<br>Deposited beach sands, silts, and gravel</td></tr>
<tr><td>30</td></tr>
<tr><td>25</td></tr>
<tr><td>20</td></tr>
<tr><td>15</td></tr>
<tr><td>10</td></tr>
<tr><td>5</td><td rowspan="4">Surficial Aquifer<br>Unconfined</td></tr>
<tr><td>0</td></tr>
<tr><td>-5</td></tr>
<tr><td>-10</td></tr>
<tr><td>-15</td><td rowspan="11">Aquitard</td><td rowspan="3">Pleistocene Clay Layer<br>(Columbia Clay) Clay</td></tr>
<tr><td>-20</td></tr>
<tr><td>-25</td></tr>
<tr><td>-30</td><td rowspan="8">Upper Yorktown Clay Unit<br>Coelescing layers consisting of fine to coarse, greenish/gray glauconitic quartz sand, clay, silt, and in part contains shell fragments.</td></tr>
<tr><td>-35</td></tr>
<tr><td>-40</td></tr>
<tr><td>-45</td></tr>
<tr><td>-50</td></tr>
<tr><td>-55</td></tr>
<tr><td>-60</td></tr>
<tr><td>-65</td></tr>
<tr><td>-70</td><td rowspan="8">Pliocene Aquifer<br>Confined</td><td rowspan="8">Upper Yorktown Formation<br>Shelly, fine to coarse glauconitic sand.</td></tr>
<tr><td>-75</td></tr>
<tr><td>-80</td></tr>
<tr><td>-85</td></tr>
<tr><td>-90</td></tr>
<tr><td>-95</td></tr>
<tr><td>-100</td></tr>
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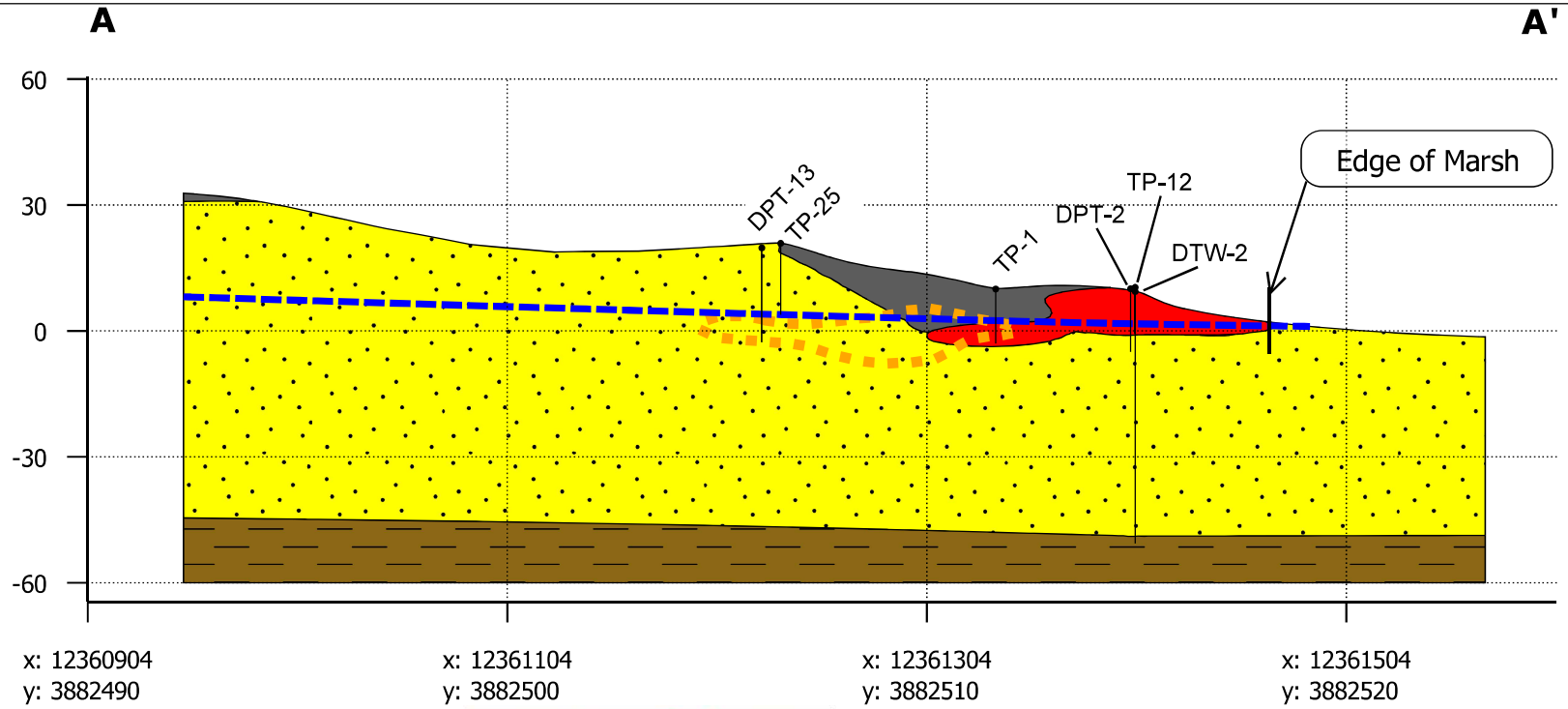
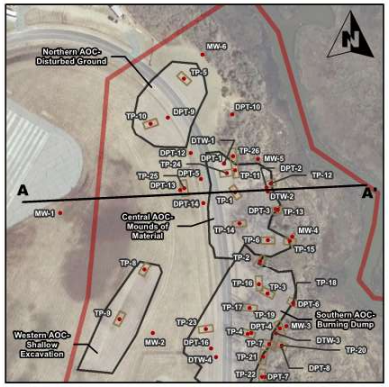
**Notes:**
Surface elevations vary for the site from 30 ft msl to 10 ft msl. For reference, monitoring well construction details can be found in Table 2-1.
All depths and geologic layers are approximate.




## Legend

- Fill
- Waste
- Pleistocene Sand
- Yorktown Clay
- Extents of Stained Material
- Nov 15-2016 Water Table




## Location

A: 12360904, 3882490

A': 12361604, 3882525

Scale: 1:1,000

Vertical exaggeration: 2x

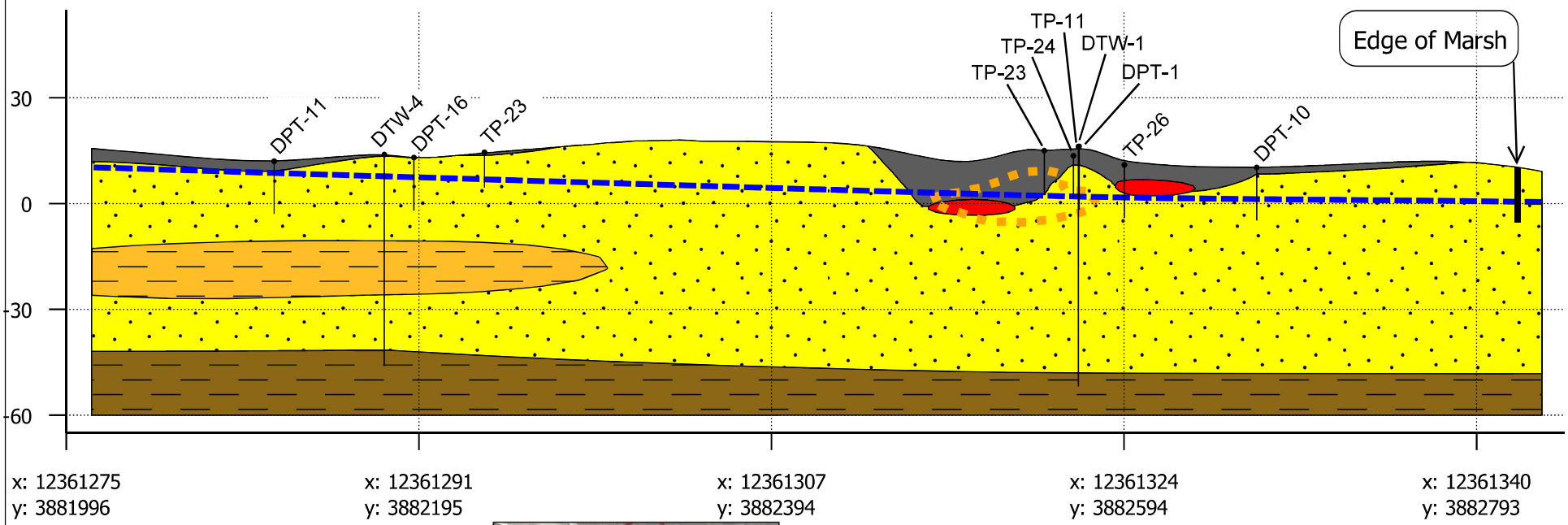
0ft 100ft

The cross section is constructed from a 3-Dimensional Model using Leapfrog software. Data points close to the line of section have been projected onto the section and are labeled. Because the section was constructed from a model, data from other points are also incorporated.

Project 15 CDM FS
WFF FUDS

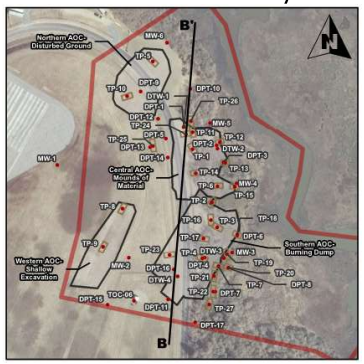
# Cross Section A-A'

Figure 2-4




## Legend

- Fill
- Waste
- Pleistocene Sand
- Yorktown_Clay
- Columbia_Clay
- Extents of Stained Material
- Nov 15-2016 Water Table




## Location

B: 12361275, 3881996

B': 12361344, 3882843

Scale: 1:1,000

Vertical exaggeration: 2x

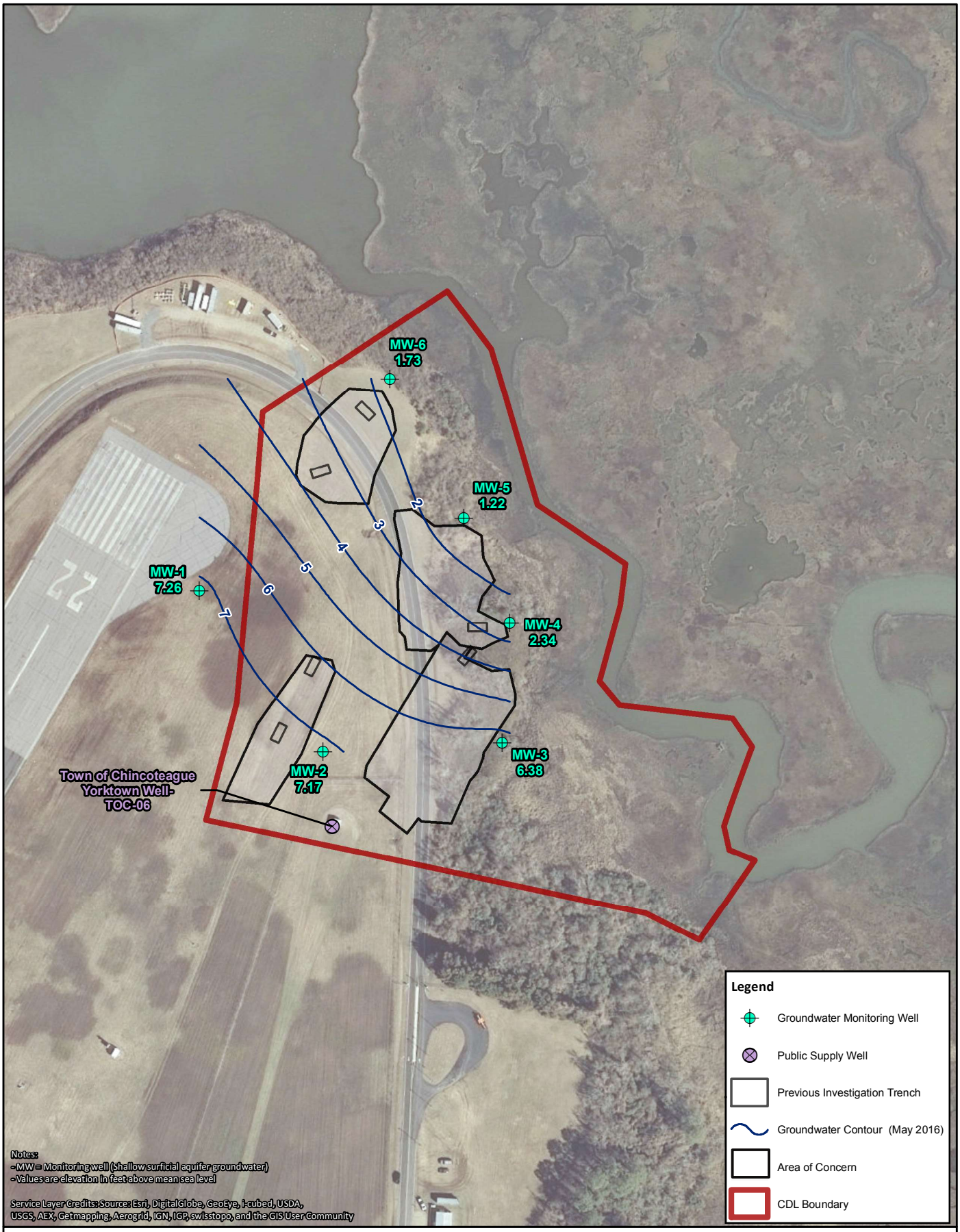
0ft 100ft

The cross section is constructed from a 3-Dimensional Model using Leapfrog software. Data points close to the line of section have been projected onto the section and are labeled. Because the section was constructed from a model, data from other points are also incorporated.

Project 15 CDM FS
WFF FUDS

# Cross Section B-B'

Figure 2-5




# May 2016 Groundwater Elevation

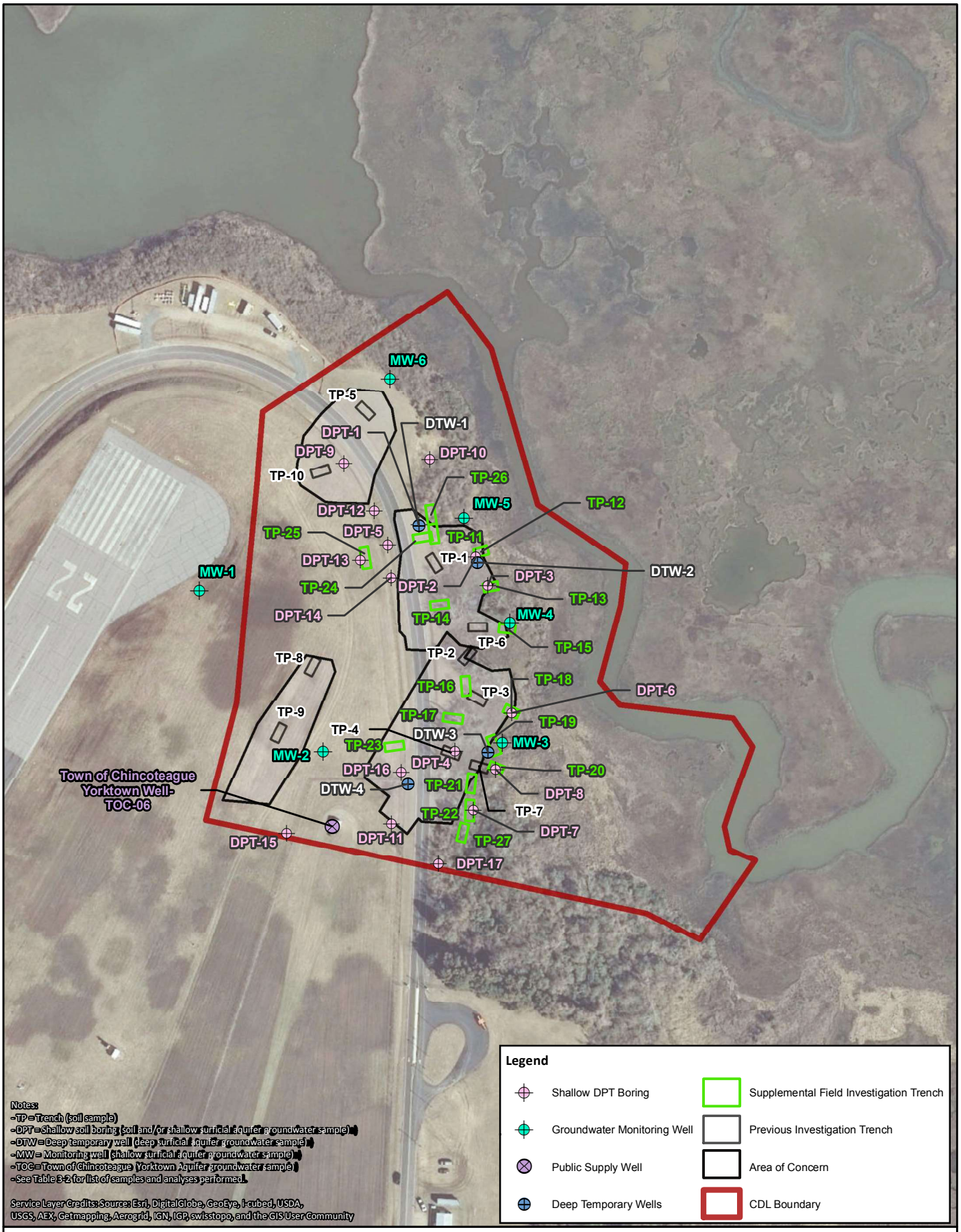
Project 15 CDL FS
WFF FUDS

**Figure 2-6**

N

0 100 200 400 Feet

FarmerRA C:_projects\Wallops Island CDL\GIS\MXD\SupplementalFieldInvestigation\Figure2-6_Project15_CDL_Soil_GW_Elev_May16_20180701.mxd 7/1/2018




# Supplemental Field Investigation Soil and Groundwater Sample Locations

Project 15 CDL FS
WFF FUDS

**Figure 3-1**

# Sediment and Pore Water Sample Locations

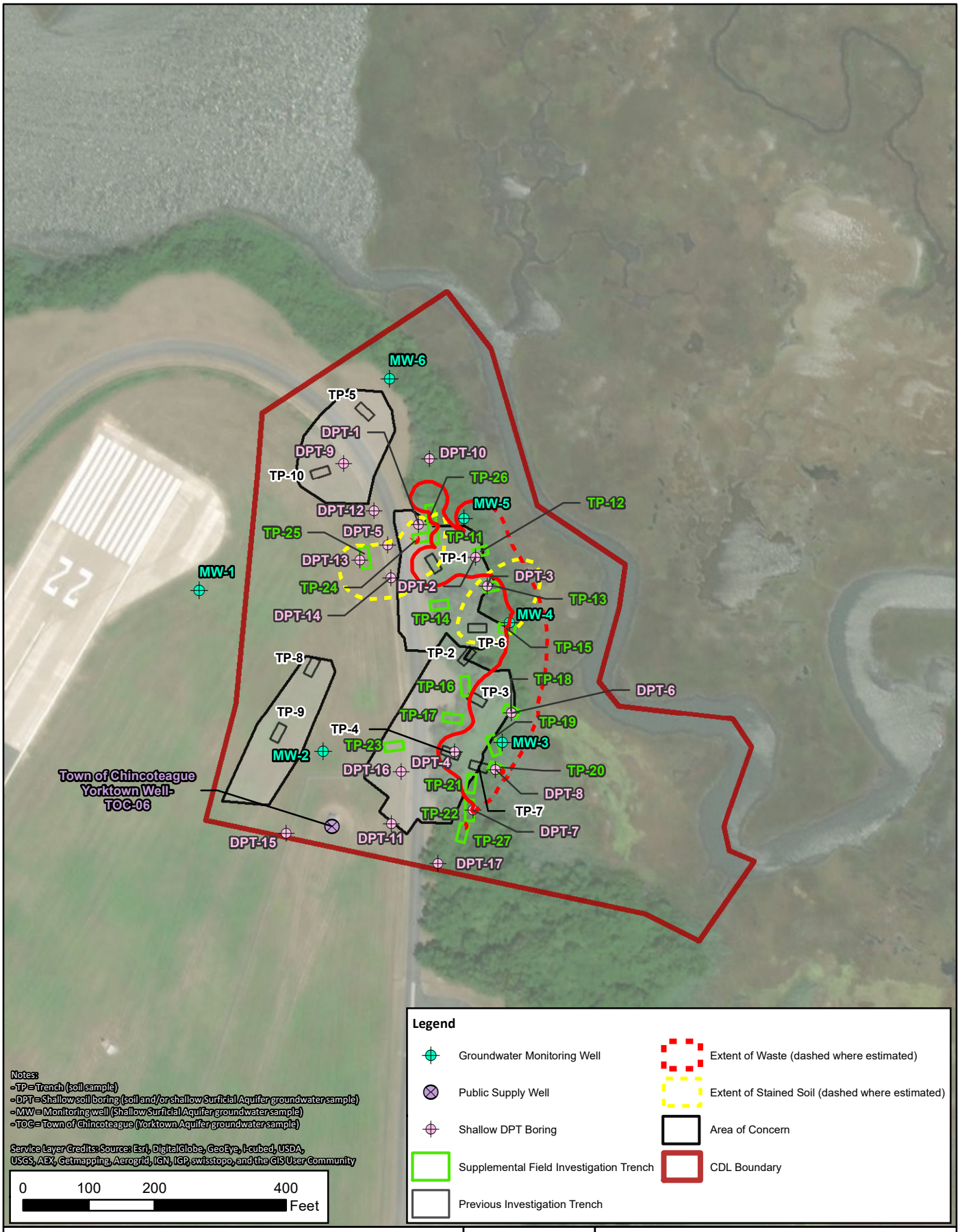
N

0 175 350 700 Feet

Project 15 CDL FS
WFF FUDS

**Figure 3-2**

FarmerRA C:_projects\Wallops Island CDL\GIS\MXD\SupplementalFieldInvestigation\Figure3-2_Project15_CDL_Sed_PW_Locations_20180710.mxd 7/10/2018




| | | | | |
|---|---|---|---|---|
| CLIENT | NASA WFF CDL SFI & NTCRA | | | |
| NOTES | Supplemental Field Investigation | | | |
| REVISED | 12/17/2020 | GIS BY | MS | 12/17/2020 |
| SCALE | 1:2,400 | CHK BY | JK | 12/17/2020 |
| Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, | | PM | JK | 12/17/2020 |

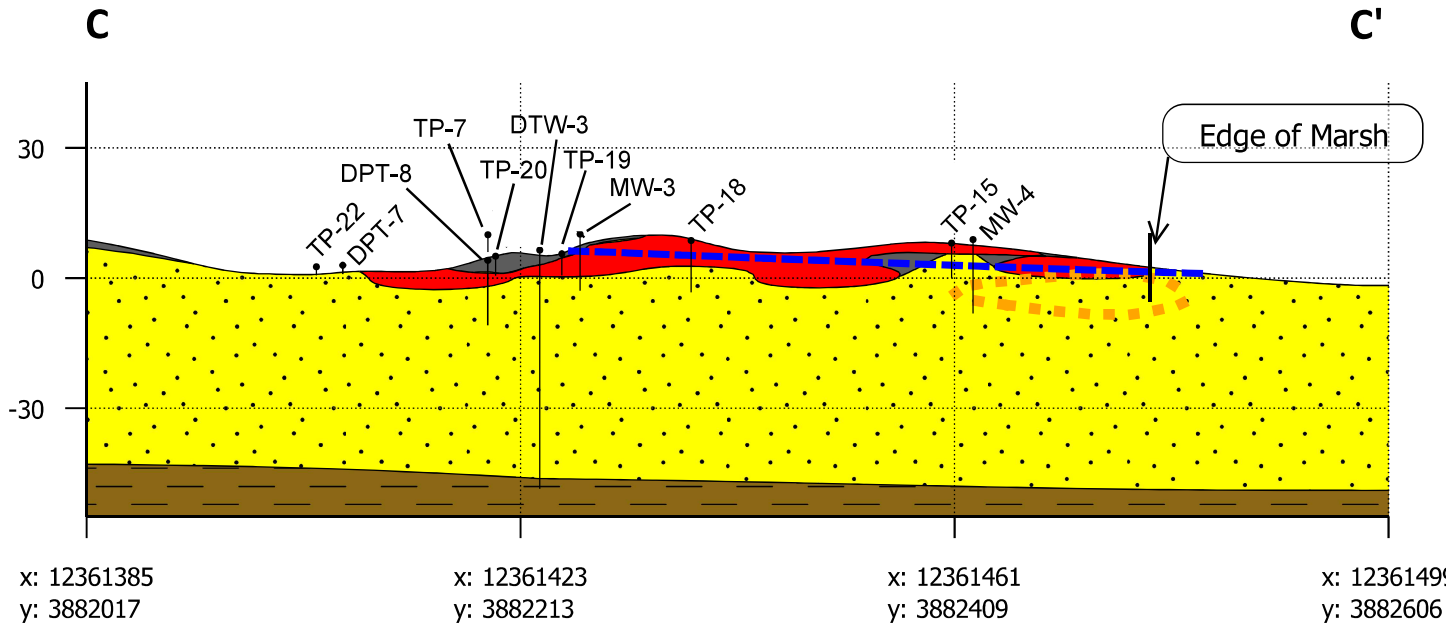
N

# Extent of Waste and Stained Sand

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

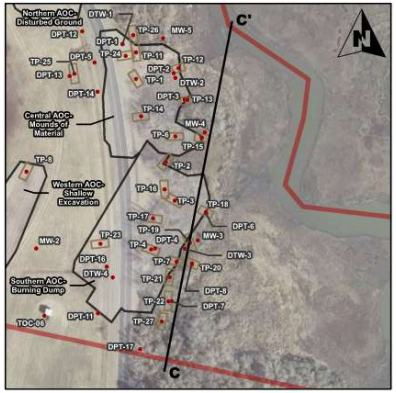
**Figure 4-1**

\\na.aecomnet.com\lfs\AMER\Germantown-USGRM2\DCS\Projects\ENV\GEARS\GEO\NASA\WFF CDL SFI\GIS\MXD\AECOM_Figures\Fig_4-1_Wallops_Island_Extent_of_Waste_Stained_Sand_12152020.mxd




## Legend

- 1 Fill
- 2 Waste
- 3 Sand
- 5 Yorktown Clay
- Extents of Stained Material
- Nov 15-2016 Water Table




## Location

D: 12361385, 3882017

D': 12361499, 3882606

Scale: 1:1,000

Vertical exaggeration: 2x

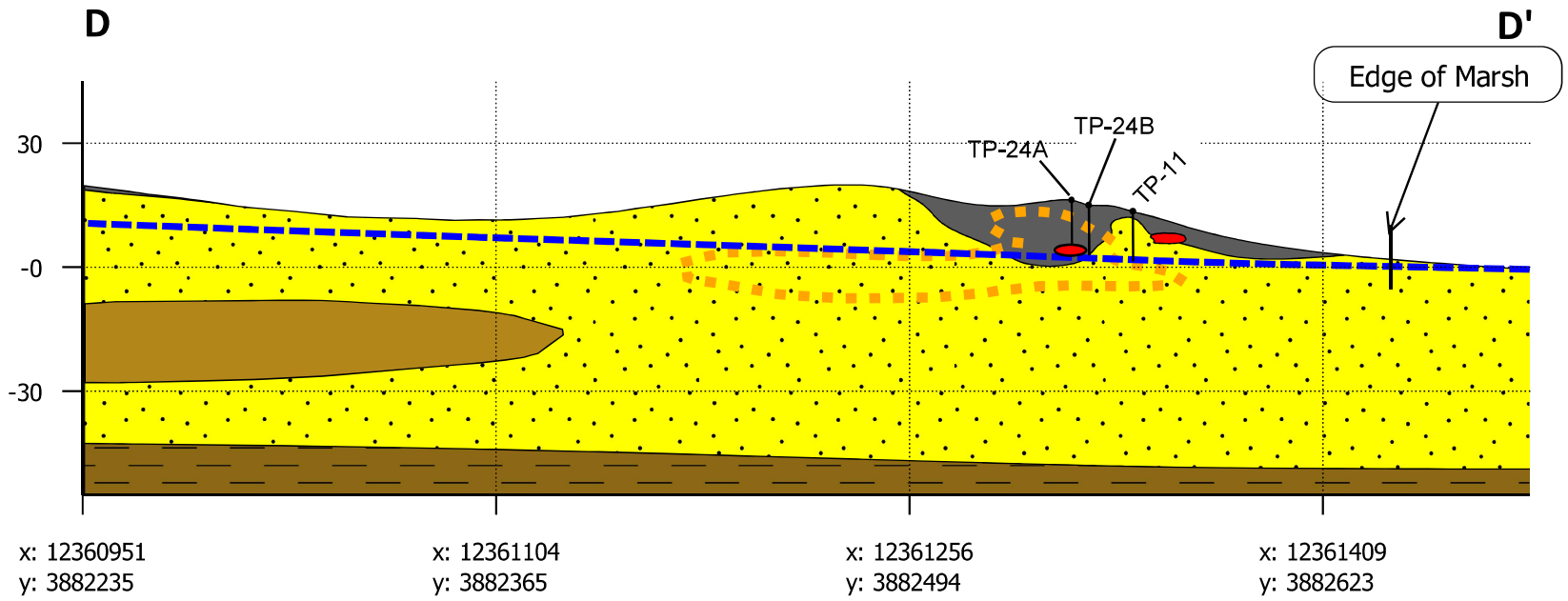
0ft 100ft

The cross section is constructed from a 3-Dimensional Model using Leapfrog software. Data points close to the line of section have been projected onto the section and are labeled. Because the section was constructed from a model, data from other points are also incorporated.

Project 15 CDM FS
WFF FUDS

# Cross Section C-C'

Figure 4-2




## Legend

- 1 Fill
- 2 Waste
- 3 Sand
- 4 Columbia Clay
- 5 Yorktown Clay
- Extents of Stained Material
- Nov 15-2016 Water Table

## Location

C: 12360951, 3882235

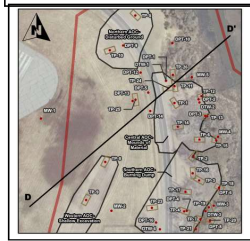
C': 12361485, 3882688

Scale: 1:1,000

Vertical exaggeration: 2x

0ft 100ft

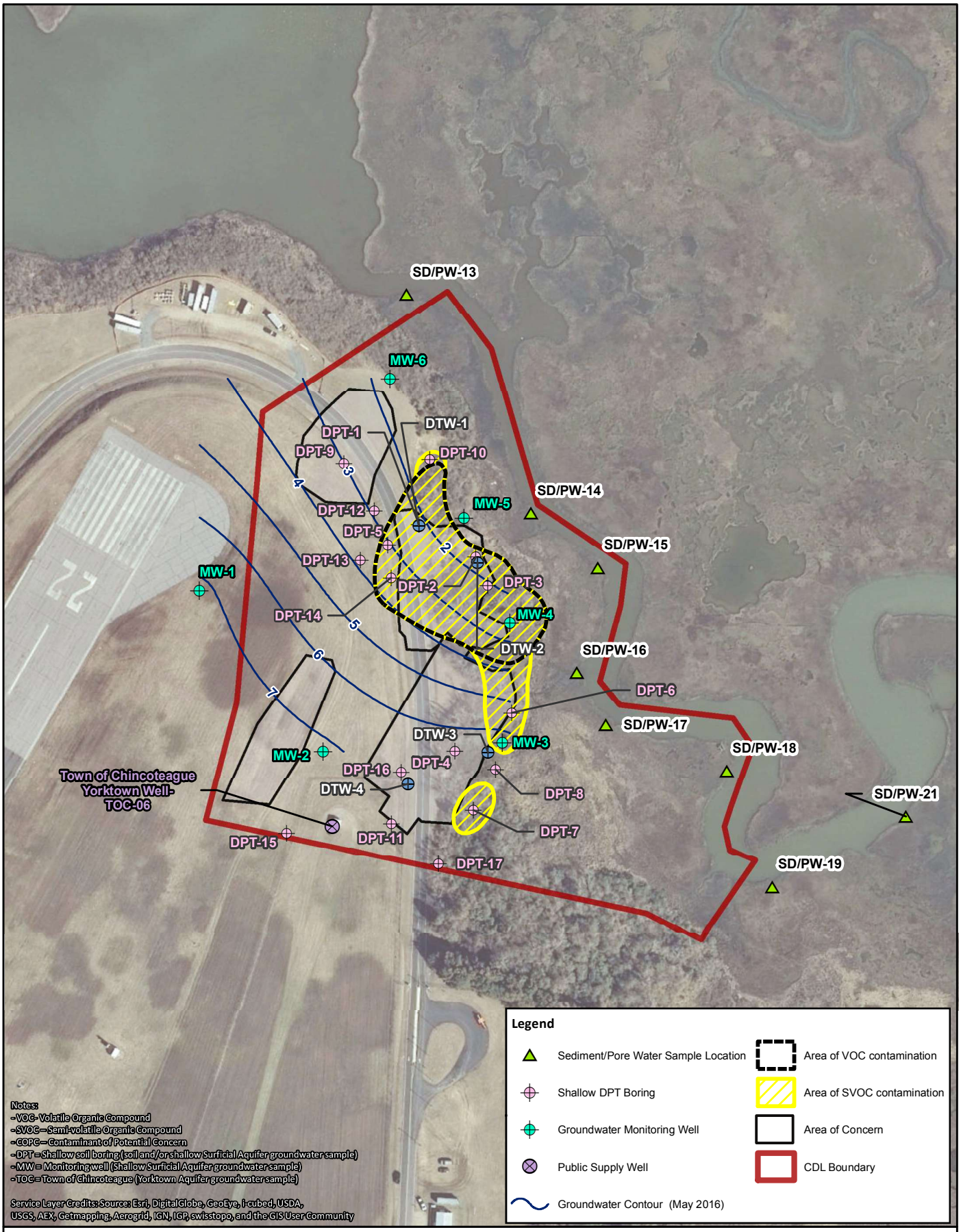
The cross section is constructed from a 3-Dimensional Model using Leapfrog software. Data points close to the line of section have been projected onto the section and are labeled. Because the section was constructed from a model, data from other points are also incorporated.



# Cross Section D-D'

Project 15 CDM FS
WFF FUDS

Figure 4-3

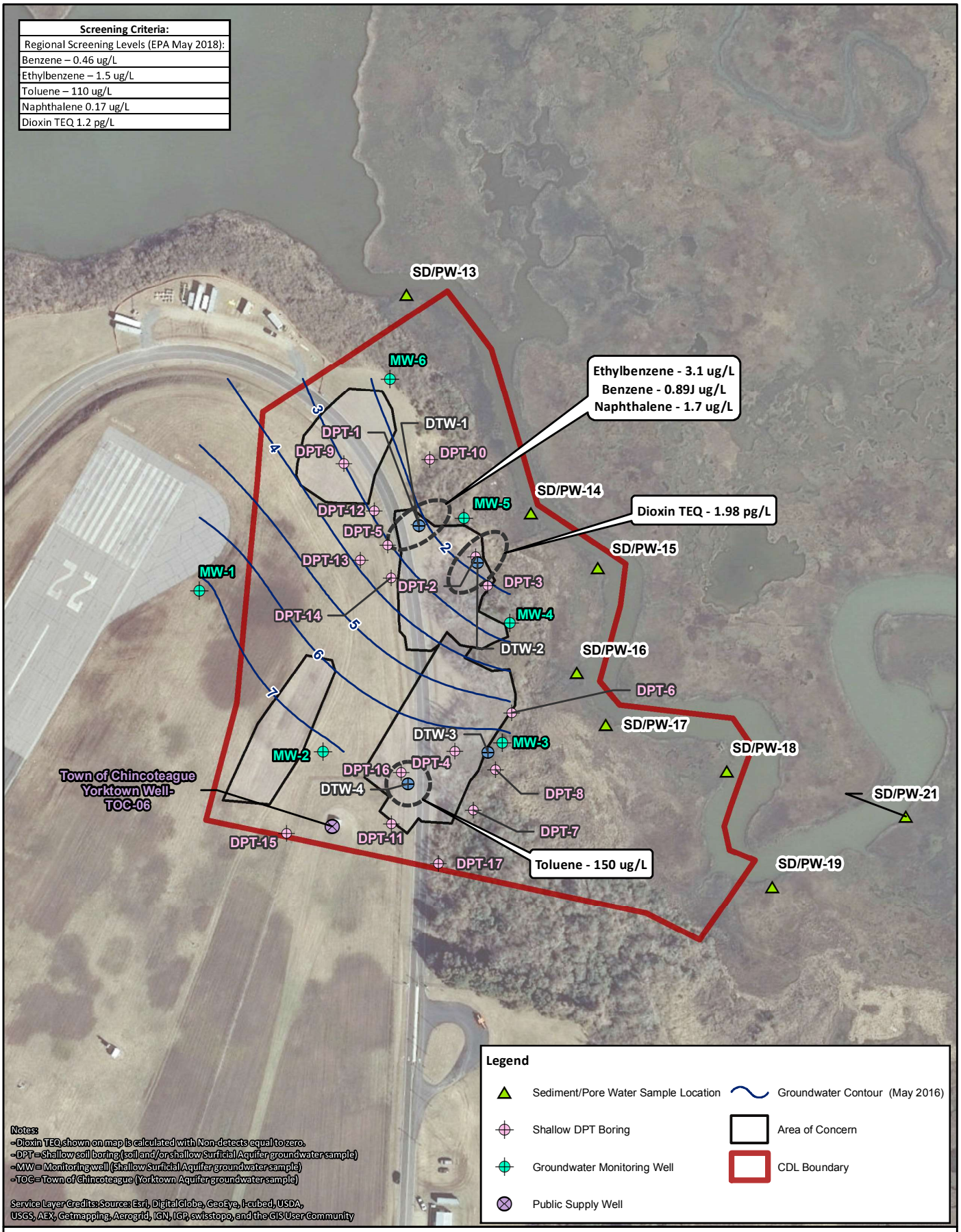



# Extent of Groundwater VOC and SVOC COPCs exceeding Tap Water Regional Screening Levels, Shallow Surficial Aquifer

Project 15 CDL FS
WFF FUDS

**Figure 4-4**

FarmerRA C:_projects\Wallops Island CDL\GIS\MXD\SupplementalFieldInvestigation\Figure4-4_Project15_CDL_SVOC_VOC_Shallow_Surficial_Aquifer_20180710.mxd 7/10/2018



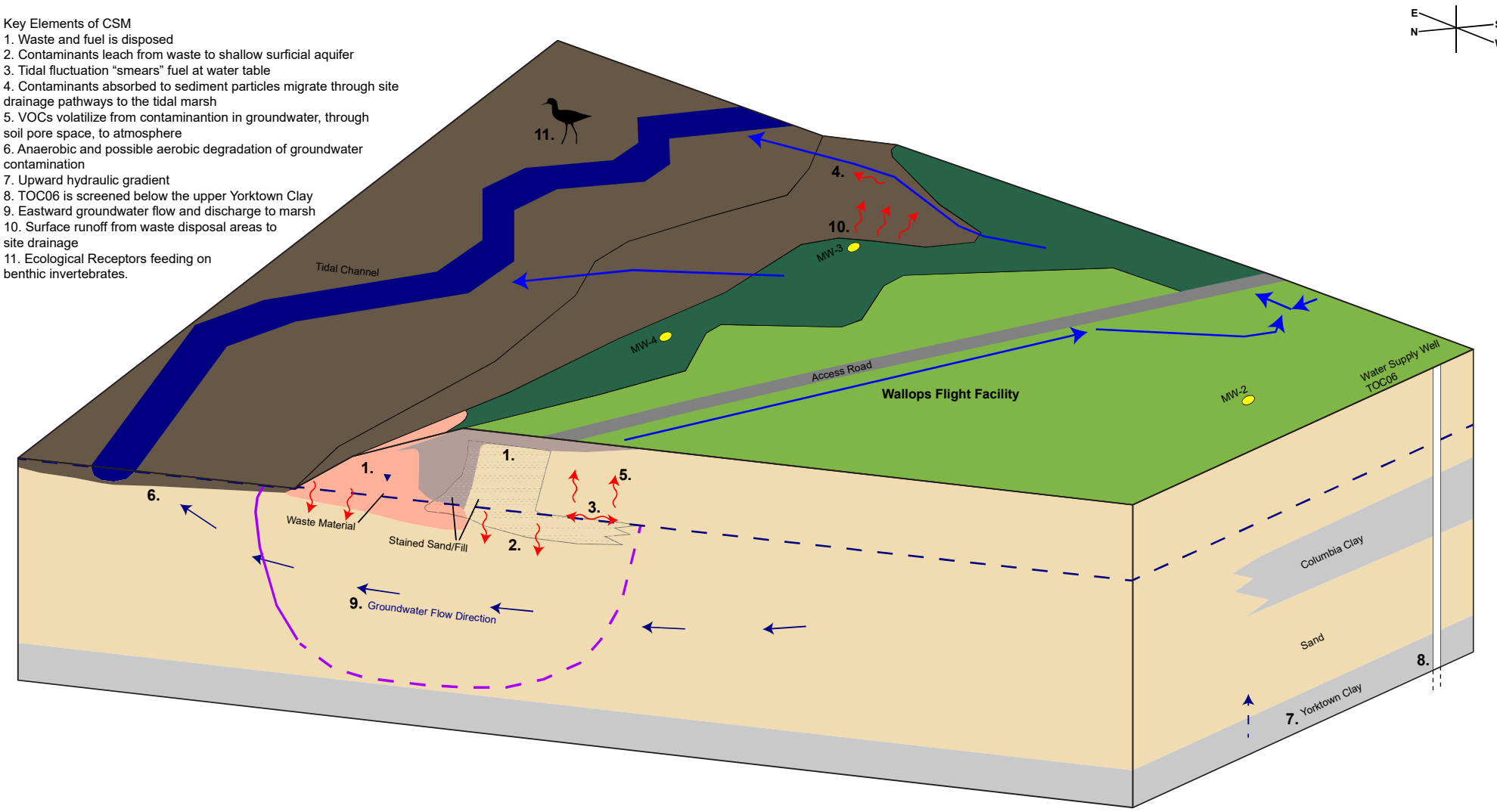

# Deep Surficial Groundwater Exceeding Organic RSLs and Maximum Background Metals Concentrations

Project 15 CDL FS
WFF FUDS

**Figure 4-5**

FarmerRA C:_projects\Wallops Island CDL\GIS\MXD\SupplementalFieldInvestigation\Figure4-X_Project15_CDL_Deep_Surficial_Aquifer_20180620.mxd 6/20/2018

Key Elements of CSM
1. Waste and fuel is disposed
2. Contaminants leach from waste to shallow surficial aquifer
3. Tidal fluctuation “smears” fuel at water table
4. Contaminants absorbed to sediment particles migrate through site drainage pathways to the tidal marsh
5. VOCs volatilize from contaminantion in groundwater, through soil pore space, to atmosphere
6. Anaerobic and possible aerobic degradation of groundwater contamination
7. Upward hydraulic gradient
8. TOC06 is screened below the upper Yorktown Clay
9. Eastward groundwater flow and discharge to marsh
10. Surface runoff from waste disposal areas to site drainage
11. Ecological Receptors feeding on benthic invertebrates.




Grass Area
Wooded Area
Tidal Marsh
Fill Material
Sand
Waste Material
Clay
Drainage Pathway
Groundwater Flow Direction
Contaminant Migration
Groundwater Contaminant Plume
Monitoring Well
Water Table

**Figure 5-1**
**Conceptual Site Model**
**Project 15 CDL**
**Wallops Flight Facility**
**Virginia**

# Tables

**Table 2-1**
**Supplemental Field Investigation and Remedial Investigation Groundwater Elevations**
**Project 15 CDL, Wallops Island, Virginia**

| Well | TOC Elevation (feet amsl) | DTW (5/12/16) (Feet) | GW Elevation (5/12/16) (Feet amsl) | DTW (11/15/16) (Feet) | GW Elevation (11/15/16) (Feet amsl) | GW Elevation (05/07) (Feet amsl) | GW Elevation (12/07) (Feet amsl) |
|---|---|---|---|---|---|---|---|
| MW-1 | 32.00 | 24.74 | 7.26 | 23.72 | 8.28 | 7.24 | 5.8 |
| MW-2 | 22.55 | 15.38 | 7.17 | 15.25 | 7.30 | 7.16 | 5.7 |
| MW-3 | 13.10 | 6.72 | 6.38 | 6.45 | 6.65 | 5.9 | 6.48 |
| MW-4 | 11.87 | 9.53 | 2.34 | 9.1 | 2.77 | 2.04 | 1.25 |
| MW-5 | 10.06 | 8.84 | 1.22 | 9.58 | 0.48 | 0.31 | -0.54 |
| MW-6 | 18.18 | 16.45 | 1.73 | 15.93 | 2.25 | 2.64 | 0.57 |

DTW = depth to water
GW = groundwater
TOC = top of inner casing
Note that groundwater elevations recorded in 2007 are reported in the Remedial Investigation Report (Versar 2013)

Table 3-1 Project 15 CDL Supplemental Field Investigation Event Activities, Wallops Flight Facility, Virginia

| Event Date | Sampling Activity | Data Gaps/Stakeholder Decisions |
|---|---|---|
| May 2015 | Excavation and logging of 14 trenches (TP-11 through TP-24). Collection of 10 soil samples. | Trench data were used to select locations for DPT borings and shallow temporary wells. |
| July 2015 | Installation and logging of 11 DPT borings (DPT-1 through DPT-11). Installation of 11 shallow temporary wells. Collection of 8 soil samples and 11 groundwater samples. | Identified data gaps in waste and groundwater contamination delineation. Additional trenches and DPT shallow wells were planned and executed in May 2016. |
| May 2016 | Excavation and logging of three trenches (TP-25 through TP-27). Collection of three soil samples.<br>Installation and soil logging of six shallow temporary wells (DPT-12 through DPT-17). Collection of six groundwater samples<br>Collection of Round 1 monitoring well groundwater samples and water level measurements. | Data from all trenches and DPT shallow temporary wells were used to select locations of deep temporary wells.<br>Concern over potential groundwater impacts on pore water and sediment in adjacent marsh prompted planning of pore water and sediment sampling. |
| August 2016 | Drilling, logging, and sampling of four deep temporary wells (DTW-1 through DTW-4).<br>Collection of 13 pore water and 13 co-located sediment samples. Three locations were selected for collection of background samples. | Minor contamination in deep temporary wells indicates need to sample water supply well TOC-06 (Yorktown Aquifer well). |
| November 2016 | Collection of Round 2 monitoring well groundwater samples.<br>Collection of TOC-06 groundwater with analysis for VOCs and dioxins/furans. | |
| November 2017 | Collection of TOC-06 groundwater sample with analysis for SVOCs and metals. | |

**Table 3-2**
**Soil Samples and Analyses, Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | Analyses: | | | |
|---|---|---|---|---|---|---|---|---|---|
| Location | Sample ID | Sample Date | Start Depth (ft bgs) | End Depth (ft bgs) | Sample Type | VOCs | SVOCs | Dioxins/ Furans | Inorganics |
| DPT1 | CDL-DPS01-00-027 | 7/21/2015 | 13 | 13.5 | N | X | X | | X |
| DPT2 | CDL-DPS02-00-020 | 7/22/2015 | 9.5 | 10 | N | X | X | | X |
| DPT3 | CDL-DPS03-00-010 | 7/22/2015 | 4.5 | 5 | N | X | X | | X |
| DPT4 | CDL-DPS04-00-15 | 7/23/2015 | 7 | 7.5 | N | X | X | | X |
| DPT5 | CDL-DPS05-00-026 | 7/24/2015 | 12.5 | 13 | N | X | X | | X |
| DPT5 | CDL-DPS05-01-026 | 7/24/2015 | 12.5 | 13 | FD | X | X | | X |
| DPT6 | CDL-DPS06-00-014 | 7/22/2015 | 6.5 | 7 | N | X | X | | X |
| DPT7 | CDL-DPS07-00-002 | 7/27/2015 | 0.5 | 1 | N | X | X | | X |
| DPT8 | CDL-DPS08-00-010 | 7/23/2015 | 4.5 | 5 | N | X | X | | X |
| DPT8 | CDL-DPS08-01-010 | 7/23/2015 | 4.5 | 5 | FD | X | X | | X |
| DPT9 | CDL-DPS09-00-035 | 7/24/2015 | 17 | 17.5 | N | X | X | | X |
| DPT9 | CDL-DPS09-01-035 | 7/24/2015 | 17 | 17.5 | FD | X | X | | X |
| DPT10 | CDL-DPS10-00-016 | 7/21/2015 | 7.5 | 8 | N | X | X | | X |
| DPT11 | CDL-DPS11-00-019 | 7/27/2015 | 9 | 9.5 | N | X | X | | X |
| TP11B | CDL-TP11B-00-12 | 5/28/2015 | 11 | 12 | N | X | X | | X |
| TP11C | CDL-TP11C-00-12 | 5/28/2015 | 11 | 12 | N | X | X | | X |
| TP12C | CDL-TP12C-00-009 | 6/2/2015 | 4.5 | 5 | N | X | X | | X |
| TP13B | CDL-TP13B-00-010 | 6/4/2015 | 4.5 | 5 | N | X | X | | X |
| TP13C | CDL-TP13C-00-006 | 6/4/2015 | 2.5 | 3 | N | X | X | | X |
| TP18B | CDL-TP18B-00-008 | 6/9/2015 | 3.5 | 4 | N | X | X | | X |
| TP19A | CDL-TP19A-00-009 | 6/9/2015 | 4 | 4.5 | N | X | X | | X |
| TP20B | CDL-TP20B-00-010 | 6/8/2015 | 4 | 4.5 | N | X | X | X | X |
| TP20B | CDL-TP20B-01-010 | 6/8/2015 | 4 | 4.5 | FD | X | X | X | X |
| TP21A | CDL-TP21A-00-007 | 6/9/2015 | 3 | 3.5 | N | X | X | | X |
| TP22B | CDL-TP22B-00-004 | 6/5/2015 | 1.5 | 2 | N | X | X | | X |
| TP24A | CDL-TP24A-00-012 | 6/10/2015 | 5.5 | 6 | N | X | X | | X |

**Table 3-2**
**Soil Samples and Analyses, Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | Analyses: | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Location** | **Sample ID** | **Sample Date** | **Start Depth (ft bgs)** | **End Depth (ft bgs)** | **Sample Type** | **VOCs** | **SVOCs** | **Dioxins/ Furans** | **Inorganics** |
| TP24A | CDL-TP24A-01-012 | 6/10/2015 | 5.5 | 6 | FD | X | X | | X |
| TP25C | CDL-TP25C-00-034 | 5/12/2016 | 16.5 | 17 | N | X | X | | X |
| TP26B | CDL-TP26B-00-010 | 5/11/2016 | 4 | 4.5 | N | X | X | | X |
| TP27A | CDL-TP27A-00-004 | 5/10/2016 | 1.5 | 1.5 | N | X | X | X | X |
| TP27A | CDL-TP27A-01-004 | 5/10/2016 | 1.5 | 1.5 | FD | X | X | X | X |

**Notes:**
FD = field duplicate sample
ft bgs = feet below ground surface
N = normal field sample
SVOCs = semi-volatile organic compounds
VOCs = volatile organic compounds

**Table 3-3**
**Groundwater Samples and Analyses, Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | Analyses: | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | Sample ID | Sample Date | Start Depth (ft bgs) | End Depth (ft bgs) | Sample Type | VOCs | SVOCs | Dioxins/ Furans | Dissolved Inorganics | Total Inorganics |
| DPW1 | CDL-DPW01-00-3039 | 7/21/2015 | 14.5 | 19.5 | N | X | X | | X | |
| DPW2 | CDL-DPW02-00-2130 | 7/22/2015 | 10 | 15 | N | X | X | | X | |
| DPW3 | CDL-DPW03-00-1120 | 7/22/2015 | 5 | 10 | N | X | X | | X | |
| DPW3 | CDL-DPW03-01-1120 | 7/22/2015 | 5 | 10 | FD | X | X | | X | |
| DPW4 | CDL-DPW04-00-1928 | 7/23/2015 | 9 | 14 | N | X | X | X | X | |
| DPW4 | CDL-DPW04-01-1928 | 7/23/2015 | 9 | 14 | FD | X | X | | X | |
| DPW5 | CDL-DPW05-00-2736 | 7/24/2015 | 13 | 18 | N | X | X | | X | |
| DPW6 | CDL-DPW06-00-1130 | 7/23/2015 | 5 | 15 | N | X | X | | X | |
| DPW7 | CDL-DPW07-1130 | 7/27/2015 | 5 | 15 | N | X | X | | X | |
| DPW8 | CDL-DPW08-00-1130 | 7/23/2015 | 5 | 15 | N | X | X | X | X | |
| DPW8 | CDL-DPW08-01-1130 | 7/23/2015 | 5 | 15 | FD | | | X | | |
| DPW9 | CDL-DPW09-00-4150 | 7/23/2015 | 20 | 25 | N | X | X | | X | |
| DPW10 | CDL-DPW10-00-1726 | 7/21/2015 | 8 | 13 | N | X | X | | X | |
| DPW11 | CDL-DPW11-00-2130 | 7/27/2015 | 10 | 15 | N | X | X | | X | |
| DPW12 | CDL-DPW12-00-2332 | 5/6/2016 | 11 | 16 | N | X | X | | X | |
| DPW13 | CDL-DPW13-00-3544 | 5/4/2016 | 17 | 22 | N | X | X | | X | |
| DPW14 | CDL-DPW14-00-3140 | 5/5/2016 | 10 | 15 | N | X | X | | X | |
| DPW14 | CDL-DPW14-01-3140 | 5/5/2016 | 10 | 15 | FD | X | X | | X | |
| DPW15 | CDL-DPW15-00-3140 | 5/5/2016 | 15 | 20 | N | X | X | X | X | |
| DPW16 | CDL-DPW16-00-2130 | 5/4/2016 | 10 | 15 | N | X | X | X | X | |
| DPW16 | CDL-DPW16-01-2130 | 5/4/2016 | 10 | 15 | FD | X | X | X | X | |
| DPW17 | CDL-DPW17-00-1928 | 5/10/2016 | 9 | 11 | N | X | X | X | X | |
| DTW1 | CDL-DTW1-00-119128 | 8/19/2016 | 59 | 64 | N | X | X | X | X | |
| DTW1 | CDL-DTW1-01-119128 | 8/19/2016 | 59 | 64 | FD | X | X | X | X | |
| DTW2 | CDL-DTW2-00-107116 | 8/26/2016 | 52 | 57 | N | X | X | X | X | |
| DTW3 | CDL-DTW3-00-097106 | 8/26/2016 | 47 | 52 | N | X | X | X | X | |
| DTW4 | CDL-DTW4-00-101110 | 8/17/2016 | 50 | 55 | N | X | X | X | X | |
| MW-1 | CDL-MW1-00-047066 | 5/13/2016 | 23 | 33 | N | X | X | | | X |
| MW-1 | CDL-MW1-00-047066-02 | 11/15/2016 | 23 | 33 | N | X | X | X | | X |
| MW-2 | CDL-MW2-00-029048 | 5/13/2016 | 14 | 24 | N | X | X | | | X |
| MW-2 | CDL-MW2-00-029048-02 | 11/15/2016 | 14 | 24 | N | X | X | X | | X |
| MW-3 | CDL-MW3-00-007026 | 5/13/2016 | 3 | 13 | N | X | X | X | | X |
| MW-3 | CDL-MW3-00-007026-02 | 11/15/2016 | 3 | 13 | N | X | X | X | | X |
| MW-3 | CDL-MW3-01-007026-02 | 11/15/2016 | 3 | 13 | FD | | X | | | X |
| MW-4 | CDL-MW4-00-009028 | 5/13/2016 | 4 | 14 | N | X | X | X | | X |
| MW-4 | CDL-MW4-00-009028-02 | 11/15/2016 | 4 | 14 | N | X | X | X | | X |
| MW-4 | CDL-MW4-01-009028 | 5/13/2016 | 4 | 14 | FD | X | X | X | | X |
| MW-4 | CDL-MW4-01-009028-02 | 11/15/2016 | 4 | 14 | FD | X | X | X | | X |
| MW-5 | CDL-MW5-00-009028 | 5/13/2016 | 23 | 33 | N | X | X | X | | X |
| MW-5 | CDL-MW5-00-009028-02 | 11/15/2016 | 23 | 33 | N | X | X | X | | X |
| MW-6 | CDL-MW6-00-023042 | 5/13/2016 | 11 | 21 | N | X | X | | | X |
| MW-6 | CDL-MW6-00-023042-02 | 11/15/2016 | 11 | 21 | N | X | X | X | | X |
| TOC-06 | CDL-PWTOC06-00-309450 | 11/14/2016 | 154 | 225 | N | X | | X | | |
| TOC-06 | CDL-PWTOC06-00-309450-02 | 11/8/2017 | 154 | 225 | N | | X | | | X |
| TOC-06 | CDL-PWTOC06-01-309450 | 11/14/2016 | 154 | 225 | FD | X | | X | | |
| TOC-06 | CDL-PWTOC06-01-309450-02 | 11/8/2017 | 154 | 225 | FD | | X | | | X |
| TOC-06 | CDL-PWTOC06-04-309450-02 | 11/8/2017 | 154 | 225 | FD | | X | | | X |

**Notes:**
FD = field duplicate sample
ft bgs = feet below ground surface
N = normal field sample
SVOCs = semi-volatile organic compounds
VOCs = volatile organic compounds

**Table 3-4**
**Pore Water Samples and Analyses, Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | Analyses: | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Location | Sample ID | Sample Date | Start Depth (ft bgs) | End Depth (ft bgs) | Sample Type | VOCs | SVOCs | Dioxins/ Furans | Inorganics |
| PW11 | CDL-PW11-00-002 | 8/25/2016 | 1 | 1 | N | X | X | X | X |
| PW12 | CDL-PW12-00-002 | 8/22/2016 | 1 | 1 | N | X | X | X | X |
| PW13 | CDL-PW13-00-002 | 8/24/2016 | 1 | 1 | N | X | X | X | X |
| PW14 | CDL-PW14-00-002 | 8/24/2016 | 1 | 1 | N | X | X | X | X |
| PW14 | CDL-PW14-01-002 | 8/24/2016 | 1 | 1 | FD | X | X | X | X |
| PW15 | CDL-PW15-00-002 | 8/24/2016 | 1 | 1 | N | X | X | X | X |
| PW16 | CDL-PW16-00-002 | 8/30/2016 | 1 | 1 | N | X | X | X | X |
| PW16 | CDL-PW16-01-002 | 8/30/2016 | 1 | 1 | FD | X | X | X | X |
| PW17 | CDL-PW17-00-002 | 8/30/2016 | 1 | 1 | N | X | X | X | X |
| PW18 | CDL-PW18-00-002 | 8/30/2016 | 1 | 1 | N | X | X | X | X |
| PW18 | CDL-PW18-01-002 | 8/30/2016 | 1 | 1 | FD | X | X | X | X |
| PW19 | CDL-PW19-00-002 | 8/29/2016 | 1 | 1 | N | X | X | X | X |
| PW20 | CDL-PW20-00-002 | 8/25/2016 | 1 | 1 | N | X | X | X | X |
| PW21 | CDL-PW21-00-002 | 8/26/2016 | 1 | 1 | N | X | X | X | X |

**Notes:**
FD = field duplicate sample
ft bgs = feet below ground surface
N = normal field sample
SVOCs = semi-volatile organic compounds
VOCs = volatile organic compounds

**Table 3-5**
**Sediment Samples and Analyses, Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | Analyses: | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Location | Sample ID | Sample Date | Start Depth (ft bgs) | End Depth (ft bgs) | Sample Type | VOCs | SVOCs | Dioxins/ Furans | Inorganics |
| SD11 | CDL-SD11-00-001 | 8/22/2016 | 0 | 0.5 | N | X | X | X | X |
| SD12 | CDL-SD12-00-001 | 8/22/2016 | 0 | 0.5 | N | X | X | X | X |
| SD13 | CDL-SD13-00-001 | 8/23/2016 | 0 | 0.5 | N | X | X | X | X |
| SD14 | CDL-SD14-00-001 | 8/23/2016 | 0 | 0.5 | N | X | X | X | X |
| SD15 | CDL-SD15-00-001 | 8/23/2016 | 0 | 0.5 | N | X | X | X | X |
| SD16 | CDL-SD16-00-001 | 8/30/2016 | 0 | 0.5 | N | X | X | X | X |
| SD16 | CDL-SD16-01-001 | 8/30/2016 | 0 | 0.5 | FD | X | X | X | X |
| SD17 | CDL-SD17-00-001 | 8/30/2016 | 0 | 0.5 | N | X | X | X | X |
| SD17 | CDL-SD17-01-001 | 8/30/2016 | 0 | 0.5 | FD | X | X | X | X |
| SD18 | CDL-SD18-00-001 | 8/30/2016 | 0 | 0.5 | N | X | X | X | X |
| SD18 | CDL-SD18-01-001 | 8/30/2016 | 0 | 0.5 | FD | X | X | X | X |
| SD19 | CDL-SD19-00-001 | 8/29/2016 | 0 | 0.5 | N | X | X | X | X |
| SD20 | CDL-SD20-00-001 | 8/22/2016 | 0 | 0.5 | N | X | X | X | X |
| SD21 | CDL-SD21-00-001 | 8/26/2016 | 0 | 0.5 | N | X | X | X | X |

**Notes:**
FD = field duplicate sample
ft bgs = feet below ground surface
N = normal field sample
SVOCs = semi-volatile organic compounds
VOCs = volatile organic compounds

Table 4-1 Relative Percent Difference Summary, Project 15 CDL, Wallops Flight Facility, Virginia

| Media (RPD Goal) | Average Relative Percent Difference | | | | |
|---|---|---|---|---|---|
| | VOCs | SVOCs | Metals | Dioxin/Furan | Duplicate Pair Points |
| Soil (<50) | 28 | 21.8 | 33.1 | 16.3 | DPT5, DPT8, DPT9, TP20B, TP24A, TP27A |
| Monitoring Well Groundwater (<20) | 4.6 | 2.2 | 13.0 | 22.0 | MW3, MW4 |
| Temporary Well Groundwater (<35) | 11.0 | 13.5 | 7.7 | 72.1 | DPW14, DPW16, DPW3 (excluding dioxins), DPW4, DPW8, DTW1, |
| Drinking Water (<20) | NC | NC | 1.1 | NC | TOC-06 |
| Sediment (<50) | 34.8 | NC | 12.5 | 78.6 | SD16, SD17, SD18 |
| Pore Water (<35) | 10.5 | 2.7 | 15.5 | 23.4 | PW14, PW16, PW18 |

NC – not calculated due to lack of detections

# Table 4-2
# Soil Analytical Data Summary - Central AOC, Project 15 CDL
# Supplemental Field Investigation
# Wallops Island, Virginia

**CENTRAL AREA OF CONCERN**

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Location | TP11B | TP11C | TP12C | TP13B | TP13C | TP24A | TP24A | TP26B | DPT1 | DPT2 | DPT3 | DPT5 | DPT5 | DPT9 | DPT9 | DPT10 |
| | | | | Sample # | CDL-TP11B-00-12 | CDL-TP11C-00-12 | CDL-TP12C-00-009 | CDL-TP13B-00-010 | CDL-TP13C-00-006 | CDL-TP24A-00-012 | CDL-TP24A-01-012 | CDL-TP26B-00-010 | CDL-DPS01-00-027 | CDL-DPS02-00-020 | CDL-DPS03-00-010 | CDL-DPS05-00-026 | CDL-DPS05-01-026 | CDL-DPS09-00-035 | CDL-DPS09-01-035 | CDL-DPS10-00-016 |
| | | | | Sample Type | N | N | N | N | N | N | FD | N | N | N | N | N | FD | N | FD | N |
| | | | | Parent Sample # | | | | | | | CDL-TP24A-00-012 | | | | | | CDL-DPS05-00-026 | | CDL-DPS09-00-035 | |
| | | | | Start Depth | 11 | 11 | 4.5 | 4.5 | 2.5 | 5.5 | 5.5 | 4 | 13 | 9.5 | 4.5 | 12.5 | 12.5 | 17 | 17 | 7.5 |
| | | | | End Depth | 12 | 12 | 5 | 5 | 3 | 6 | 6 | 4.5 | 13.5 | 10 | 5 | 13 | 13 | 17.5 | 17.5 | 8 |
| | | | | Depth Unit | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| | | | | Sample Date | 5/28/2015 | 5/28/2015 | 6/2/2015 | 6/4/2015 | 6/4/2015 | 6/10/2015 | 6/10/2015 | 5/11/2016 | 7/21/2015 | 7/22/2015 | 7/22/2015 | 7/24/2015 | 7/24/2015 | 7/24/2015 | 7/24/2015 | 7/21/2015 |
| Analyte | EPA RSL Residential | EPA RSL Industrial | Site-specific Soil SLs | Units | | | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | |
| 1,1,2-TRICHLOROETHANE-c | 150 | 630 | | ug/kg | -- | -- | -- | **25000 J** | **28000** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-BUTANONE (MEK) | 2,700,000 | 19,000,000 | | ug/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | 11 J | -- | -- | -- | -- | -- | -- |
| 2-HEXANONE | 20,000 | 130,000 | | ug/kg | -- | -- | -- | **86000 J** | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-METHYL-2-PENTANONE (MIBK) | 3,300,000 | 14,000,000 | | ug/kg | -- | -- | -- | 74000 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ACETONE | 6,100,000 | 67,000,000 | | ug/kg | -- | -- | -- | -- | -- | 44 J | 83 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZENE | 1,200 | 5,100 | | ug/kg | -- | -- | -- | -- | -- | 410 | 550 | -- | **3000 J** | -- | -- | -- | -- | -- | -- | -- |
| CYCLOHEXANE | 650,000 | 2,700,000 | | ug/kg | -- | -- | -- | 14000 J | 38000 | 220 | 190 | -- | 11000 | -- | -- | -- | -- | -- | -- | -- |
| ETHYLBENZENE | 5,800 | 25,000 | | ug/kg | -- | -- | -- | **9100 J** | **16000** | 1300 J | 2300 J | -- | 2400 J | -- | -- | -- | -- | -- | -- | -- |
| ISOPROPYLBENZENE | 190,000 | 990,000 | | ug/kg | 520 J | 11000 J | -- | 2500 J | 4100 J | 43 | 44 | -- | 4600 J | -- | -- | -- | -- | -- | -- | -- |
| METHYLCYCLOHEXANE | No RSL | No RSL | | ug/kg | | 170000 | -- | 12000 J | 66000 | 1300 J | 2300 J | -- | 56000 | -- | -- | -- | -- | -- | -- | -- |
| TOLUENE | 490,000 | 4,700,000 | | ug/kg | -- | -- | -- | -- | -- | 1200 | 1900 | -- | -- | -- | -- | 1.9 J | 1.7 J | -- | -- | -- |
| XYLENES (TOTAL) | 58,000 | 250,000 | | ug/kg | 2000 J | 45000 | -- | 16000 J | **59000** | 9400 J | 16000 J | -- | 25000 J | -- | -- | -- | -- | 1.7 J | 1.8 J | -- |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | -- |
| 1,1'-Biphenyl | 4,700 | 20,000 | | ug/kg | 300 J | 1000 | -- | 680 J | 910 J | -- | -- | -- | 2200 | -- | -- | -- | -- | -- | -- | -- |
| 2,4-DIMETHYLPHENOL | 130,000 | 1,600,000 | | ug/kg | -- | -- | -- | -- | -- | 68 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-METHYLNAPHTHALENE | 24,000 | 300,000 | | ug/kg | 2400 J | 11000 | 64 J | 4400 | 10000 | 93 J | 87 J | 860 J | 19000 | -- | -- | -- | -- | -- | -- | -- |
| 3-NITROANILINE | No RSL | No RSL | | ug/kg | -- | -- | -- | -- | 220 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ACENAPHTHENE | 360,000 | 4,500,000 | | ug/kg | -- | 550 J | 240 J | -- | -- | 160 J | 170 J | 4000 | 2800 | -- | -- | -- | -- | -- | -- | -- |
| ACENAPHTHYLENE | No RSL | No RSL | | ug/kg | -- | -- | -- | -- | -- | 38 J | 77 J | 430 J | -- | -- | -- | -- | -- | -- | -- | -- |
| ANTHRACENE | 1,800,000 | 23,000,000 | | ug/kg | 170 J | 210 J | 500 | -- | -- | 260 J | 390 | 13000 | 1800 J | -- | -- | -- | -- | -- | -- | -- |
| BENZALDEHYDE | 170,000 | 820,000 | | ug/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(A)ANTHRACENE | 1,100 | 21,000 | 550 | ug/kg | 130 J | 130 | ***1500*** | -- | -- | *710* | 540 | ***27000*** | *850* | -- | -- | -- | -- | -- | -- | -- |
| BENZO(A)PYRENE | 110 | 2,100 | 410 | ug/kg | 100 J | 85 | ***1700*** | -- | -- | ***870*** | **660** | ***23000*** | **670 J** | -- | -- | -- | -- | -- | -- | -- |
| BENZO(B)FLUORANTHENE | 1,100 | 21,000 | 640 | ug/kg | 120 J | 120 J | ***2100 J*** | -- | -- | ***1200*** | *890* | **29000** | *750* | -- | -- | -- | -- | -- | -- | -- |
| BENZO(G,H,I)PERYLENE | No RSL | No RSL | | ug/kg | 39 J | -- | 630 | -- | -- | 450 | 310 J | 9600 | 180 J | -- | -- | -- | -- | -- | -- | -- |
| BENZO(K)FLUORANTHENE | 11,000 | 210,000 | 290 | ug/kg | 47 J | 45 | *940* | -- | -- | *480* | *360 J* | ***11000*** | *300 J* | -- | -- | -- | -- | -- | -- | -- |
| BIS(2-ETHYLHEXYL)PHTHALATE | 39,000 | 160,000 | 210 | ug/kg | -- | -- | *4600 J* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 110 J | 110 J | -- |
| CARBAZOLE | No RSL | No RSL | | ug/kg | -- | -- | 280 J | -- | -- | 60 J | 100 J | 4200 | 520 | -- | -- | -- | -- | -- | -- | -- |
| CHRYSENE | 110,000 | 2,100,000 | 630 | ug/kg | 91 J | 76 | *1600* | -- | -- | *800* | 580 | *25000* | *750* | -- | -- | -- | -- | -- | -- | -- |
| DIBENZOFURAN | 7,800 | 120,000 | | ug/kg | 220 J | -- | 110 J | -- | -- | 110 J | 130 J | 2200 J | 2600 | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | 630,000 | 8,200,000 | | ug/kg | -- | 65 | -- | -- | -- | -- | -- | -- | 690 | -- | -- | -- | -- | -- | -- | -- |
| FLUORANTHENE | 240,000 | 3,000,000 | 1000 | ug/kg | 380 J | 320 | *3100* | -- | -- | *1700* | *1700* | *50000* | *2800* | -- | -- | -- | -- | -- | -- | -- |
| FLUORENE | 240,000 | 3,000,000 | | ug/kg | 260 J | 510 | 210 J | -- | -- | 200 J | 230 J | 5300 | 2800 | -- | -- | -- | -- | -- | -- | -- |
| INDENO(1,2,3-CD)PYRENE | 1,100 | 21,000 | | ug/kg | 37 J | -- | 540 | -- | -- | 400 | 310 J | **9600** | 200 J | -- | -- | -- | -- | -- | -- | -- |
| NAPHTHALENE | 2,000 | 8,600 | | ug/kg | 590 J | **4000** | 96 J | **2200** | **3500** | 540 | 500 | 1000 J | **12000** | -- | -- | -- | -- | -- | -- | -- |
| PAH, HMW Total | No RSL | No RSL | | ug/kg | 1194 | 1016 | 14710 | -- | -- | 7810 | 6450 | 229200 | 8800 | -- | -- | -- | -- | -- | -- | -- |
| PAH, LMW Total | No RSL | No RSL | | ug/kg | 1670 | 6060 | 3046 | 2450 | 3740 | 2698 | 3267 | 62730 | 25200 | -- | -- | -- | -- | -- | -- | -- |
| PHENANTHRENE | No RSL | No RSL | 790 | ug/kg | 650 J | *790 J* | *2000* | 250 J | 240 J | *1500* | *1900* | *39000* | *5800* | -- | -- | -- | -- | -- | -- | -- |
| PYRENE | 180,000 | 2,300,000 | 890 | ug/kg | 250 J | 240 | *2600* | -- | -- | *1200* | *1100* | *45000* | *2300* | -- | -- | -- | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | | | | | | | | | | | |
| ALUMINUM | 7,700 | 110,000 | 13,900 | mg/kg | ***18000*** | 11000 | 9100 | 7500 | 5600 | **13000** | **11000** | **12000** | 6900 | **11000** | 6100 | 3700 | 3600 | 4800 | 4300 | 7500 |
| ANTIMONY | 3.1 | 47 | -- | mg/kg | -- | -- | **7.9 J** | -- | -- | 0.59 J | -- | 1.6 J | -- | **17** | -- | -- | -- | -- | -- | -- |
| ARSENIC | 0.68 | 3 | 14 | mg/kg | **4.4** | **3** | **6** | **0.99** | **0.85** | **6.9** | **6.7** | *59* | **1.1** | **5.1** | **1** | **0.75 J** | 0.63 J | **0.91** | **1** | **1.1** |
| BARIUM | 1,500 | 22,000 | 114 | mg/kg | 57 | 39 | 95 | 11 | 19 | 57 | 52 | *510* | 14 | 70 | 19 | 9.5 | 9.5 | 10 | 9.2 | 14 |
| BERYLLIUM | 16 | 230 | 1.2 | mg/kg | 0.33 J | 0.23 J | 0.1 J | 0.08 J | 0.048 J | 0.26 J | 0.24 J | -- | 0.089 J | 0.39 | 0.19 J | 0.035 J | 0.031 J | 0.068 J | 0.06 J | 0.084 J |
| CADMIUM | 7.1 | 98 | 0.84 | mg/kg | 0.056 J | 0.029 J | 0.53 | 0.028 J | 0.027 J | *0.91 J* | *3.2 J* | 2 | -- | 1.3 | -- | -- | -- | 0.052 J | 0.058 J | -- |
| CALCIUM | No RSL | No RSL | 1,390 | mg/kg | 850 | 470 | *11000* | 450 | 260 J | 1200 | 1200 | *18000* | -- | *1800* | 580 | -- | -- | -- | -- | -- |
| CHROMIUM | 0.3 | 6.3 | 18 | mg/kg | **16** | **10** | **13** | **6.4** | **5.5** | **15** | **13** | *63* | **5.6** | ***22*** | **5.1** | **4** | **4** | **12** | **12** | **5.5** |
| COBALT | 2.3 | 35 | 7.3 | mg/kg | **3.5** | **2.5** | **2.9** | 1.4 | 1.3 J | **2.9** | **2.5 J** | *12* | 1.4 | **2.5** | 1.6 | 0.76 J | 0.5 J | 0.74 J | 0.69 J | 1.3 J |
| COPPER | 310 | 4,700 | 33 | mg/kg | 5.7 | 3.7 | 20 | 2.6 | 1.7 | 15 | 13 | *82* | 2.4 J | *130* | 2.3 J | 1.8 J | 1.6 J | 5 | 5 | 2.5 J |
| IRON | 5,500 | 82,000 | 10,900 | mg/kg | ***14000*** | **6600** | **9700** | 3000 | 2800 | **8200** | **7400** | ***35000*** | 2500 | **10000** | 3500 | 1800 | 1800 | 3100 | 2900 | 3200 |
| LEAD | 400 | 800 | 124 | mg/kg | 10 | 15 | *170 J* | *96* | 12 | *31* | *39* | ***1000*** | 16 | ***4900*** | 4.1 | 3.1 | 2.6 | 2.9 | 2.9 | 2.4 |
| MAGNESIUM | No RSL | No RSL | 1,450 | mg/kg | 1200 | 790 | *1600 J* | 310 | 520 | 1000 | 890 | *14000* | 260 J | 1300 | 490 | 130 J | 130 J | 260 | 230 J | 310 |
| MANGANESE | 180 | 2,600 | 781 | mg/kg | 150 | 57 | 170 J | 19 | 23 | 140 | 150 | 160 | 16 | 96 | 58 | 29 | 20 | 33 | 30 | 39 |
| MERCURY | 1.1 | 4.6 | 0.25 | mg/kg | 0.04 J | 0.012 J | 0.076 J | -- | -- | 0.23 | 0.095 | 0.14 | -- | 0.065 J | 0.0092 J | -- | -- | -- | -- | -- |
| NICKEL | 150 | 2,200 | 11 | mg/kg | 8 | 6.1 | *11* | 4.1 | 3.2 | 6.7 | 5.9 | *31* | 2.8 | *11* | 3 | 1.4 J | 1.3 J | 3 | 2.8 | 4.4 |
| POTASSIUM | No RSL | No RSL | 756 | mg/kg | 720 | 500 | 620 J | 240 J | 450 | 660 | 520 J | *1700* | -- | 660 | -- | -- | -- | -- | -- | -- |
| SILVER | 39 | 580 | 0.3 | mg/kg | -- | -- | 0.12 J | -- | -- | -- | -- | -- | -- | *0.59 J* | -- | -- | -- | -- | -- | -- |
| SODIUM | No RSL | No RSL | 31 | mg/kg | -- | 37 J | *110 J* | 27 J | *56 J* | -- | -- | *51 J* | 19 J | *290 J* | 27 J | -- | -- | *32 J* | *32 J* | 22 J |
| VANADIUM | 39 | 580 | 29 | mg/kg | 27 | 15 | 15 | 7.6 | 8 | 18 | 16 | 23 | 6.4 | 17 | 7.2 | 4.2 | 4.2 | 5.6 | 5.1 | 7.1 |
| ZINC | 2,300 | 35,000 | 104 | mg/kg | 28 | 15 | *540* | 6.2 | 7.5 | 70 | 58 | *750* | 5.3 | *240* | 7.9 | 16 | 17 | 32 | 32 | 5 |

**Notes:**

- Screening levels include the EPA Regional Screeening Levels (RSL) for Residential and Industrial Soil (EPA May 2021) and Site Specific Screening Levels (Molena soil Maximum detected concentration [Tetra Tech 2021]).
- Bolded values exceed the Residential RSL; shaded cells indicate exceedance of the Industrial RSL.; italicized and underlined values exceed the Site-specfic soil screening levels

FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
N = normal field samples
NA = not analyzed
PAHs = polycyclic aromatic hydrocarbons
R = result or limit of detection was rejected
µg/kg = micrograms per kilogram
"-" = Not detected

# Table 4-3
# Soil Analytical Data Summary - Southern AOC, Project 15 CDL
# Supplemental Field Investigation
# Wallops Island, Virginia

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Location | TP18B | TP19A | TP20B | TP20B | TP21A | TP22B | TP27A | TP27A | DPT4 | DPT6 | DPT7 | DPT8 | DPT8 | DPT11 |
| | | | | Sample # | CDL-TP18B-00-008 | CDL-TP19A-00-009 | CDL-TP20B-00-010 | CDL-TP20B-01-010 | CDL-TP21A-00-007 | CDL-TP22B-00-004 | CDL-TP27A-00-004 | CDL-TP27A-01-004 | CDL-DPS04-00-15 | CDL-DPS06-00-014 | CDL-DPS07-00-002 | CDL-DPS08-00-010 | CDL-DPS08-01-010 | CDL-DPS11-00-019 |
| | | | | Sample Type | N | N | N | FD | N | N | N | FD | N | N | N | N | FD | N |
| | | | | Parent Sample # | | | | CDL-TP20B-00-010 | | | | CDL-TP27A-00-004 | | | | | CDL-DPS08-00-010 | |
| | | | | Start Depth | 3.5 | 4 | 4 | 4 | 3 | 1.5 | 1.5 | 1.5 | 7 | 6.5 | 0.5 | 4.5 | 4.5 | 9 |
| | | | | End Depth | 4 | 4.5 | 4.5 | 4.5 | 3.5 | 2 | 1.5 | 1.5 | 7.5 | 7 | 1 | 5 | 5 | 9.5 |
| | | | | Depth Unit | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| | | | | Sample Date | 6/9/2015 | 6/9/2015 | 6/8/2015 | 6/8/2015 | 6/9/2015 | 6/5/2015 | 5/10/2016 | 5/10/2016 | 7/23/2015 | 7/22/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/27/2015 |
| Analyte | EPA RSL Residential | EPA RSL Industrial | Site-specific Soil SLs | Units | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | |
| 2-Butanone (MEK) | 2,700,000 | 19,000,000 | | ug/kg | -- | -- | 19 | 25 | -- | -- | -- | -- | -- | -- | -- | -- | 7.9 J | -- |
| ACETONE | 6,100,000 | 67,000,000 | | ug/kg | -- | -- | 69 | 84 | -- | 12 J | -- | -- | -- | 22 | -- | 25 J | 35 | 42 J |
| BENZENE | 1,200 | 5,100 | | ug/kg | -- | -- | -- | -- | -- | -- | -- | 1.4 J | -- | -- | -- | -- | -- | -- |
| METHYLENE CHLORIDE | 35,000 | 320,000 | | ug/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2.9 J | 2.6 J | -- |
| TOLUENE | 490,000 | 4,700,000 | | ug/kg | -- | -- | -- | -- | -- | -- | -- | -- | 2.2 J | -- | -- | -- | -- | -- |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | |
| 2-METHYLNAPHTHALENE | 24,000 | 300,000 | | ug/kg | -- | -- | -- | -- | 24 J | -- | -- | -- | -- | -- | -- | -- | 24 J | -- |
| ACENAPHTHENE | 360,000 | 4,500,000 | | ug/kg | -- | -- | -- | -- | 42 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ACENAPHTHYLENE | No RSL | No RSL | | ug/kg | -- | -- | -- | -- | 66 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ANTHRACENE | 1,800,000 | 23,000,000 | | ug/kg | -- | -- | -- | -- | 160 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZALDEHYDE | 170,000 | 820,000 | | ug/kg | -- | -- | -- | 45 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(A)ANTHRACENE | 1,100 | 21,000 | 550 | ug/kg | -- | -- | -- | -- | 130 J | -- | 17 J | -- | -- | -- | 38 J | 28 J | -- | -- |
| BENZO(A)PYRENE | 110 | 2,100 | 410 | ug/kg | -- | -- | 44 J | -- | **270 J** | -- | 10 J | -- | -- | -- | -- | -- | -- | -- |
| BENZO(B)FLUORANTHENE | 1,100 | 21,000 | 640 | ug/kg | -- | -- | -- | -- | *650* | -- | 15 J | -- | -- | -- | -- | -- | -- | -- |
| BENZO(G,H,I)PERYLENE | No RSL | No RSL | | ug/kg | -- | -- | -- | -- | 300 J | 41 J | -- | 10 J | -- | -- | 33 J | -- | -- | -- |
| BENZO(K)FLUORANTHENE | 11,000 | 210,000 | 290 | ug/kg | -- | -- | -- | -- | 260 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BIS(2-ETHYLHEXYL)PHTHALATE | 39,000 | 160,000 | 210 | ug/kg | -- | -- | -- | -- | -- | -- | -- | -- | 190 J | -- | 130 J | 130 J | -- | -- |
| CARBAZOLE | No RSL | No RSL | | ug/kg | -- | -- | -- | -- | 40 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CHRYSENE | 110,000 | 2,100,000 | 630 | ug/kg | -- | -- | -- | -- | 160 J | -- | -- | -- | -- | -- | 20 J | 14 J | -- | -- |
| DIBENZOFURAN | 7,800 | 120,000 | | ug/kg | -- | -- | -- | -- | 28 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| FLUORANTHENE | 240,000 | 3,000,000 | 1000 | ug/kg | 13 J | 14 J | 29 J | 26 J | 450 | -- | 26 J | -- | -- | -- | 27 J | 18 J | -- | -- |
| FLUORENE | 240,000 | 3,000,000 | | ug/kg | -- | -- | -- | -- | 38 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| INDENO(1,2,3-CD)PYRENE | 1,100 | 21,000 | | ug/kg | -- | -- | -- | -- | 350 J | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PAH, HMW Total | No RSL | No RSL | | ug/kg | 13 | 14 | 95 | 50 | 3000 | 41 | 90 | 10 | -- | -- | 143 | 60 | -- | -- |
| PAH, LMW Total | No RSL | No RSL | | ug/kg | -- | -- | -- | 24 | 516 | -- | -- | -- | -- | -- | -- | 26 | 29 | -- |
| PHENANTHRENE | No RSL | No RSL | 790 | ug/kg | -- | -- | -- | 24 J | 210 J | -- | -- | -- | -- | -- | -- | 26 J | 29 J | -- |
| PYRENE | 180,000 | 2,300,000 | 890 | ug/kg | -- | -- | 22 J | 24 J | 430 | -- | 22 J | -- | -- | -- | 25 J | -- | -- | -- |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN | No RSL | No RSL | | pg/g | NA | NA | 46.6 J | 59.5 J | NA | NA | 289 | 208 | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,6,7,8-HPCDF | No RSL | No RSL | | pg/g | NA | NA | 9.11 | 14.4 J | NA | NA | 45.4 J | 41.2 J | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8,9-HPCDF | No RSL | No RSL | | pg/g | NA | NA | -- | -- | NA | NA | 3.32 J | 3.3 J | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN | 100 | 470 | | pg/g | NA | NA | -- | -- | NA | NA | 5.71 | 4.6 | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-HXCDF | No RSL | No RSL | | pg/g | NA | NA | -- | 1.79 J | NA | NA | 10 | 10.8 | NA | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN | 100 | 470 | | pg/g | NA | NA | -- | 2.23 J | NA | NA | 12.9 | 9.75 | NA | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-HXCDF | No RSL | No RSL | | pg/g | NA | NA | -- | -- | NA | NA | 9.48 | 9.64 | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN | 100 | 470 | | pg/g | NA | NA | 1.83 J | 2.2 J | NA | NA | 11.6 | 8.83 | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-HXCDF | No RSL | No RSL | | pg/g | NA | NA | -- | -- | NA | NA | 2.8 J | 2.79 J | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8-PENTACHLORODIBENZOFURAN | No RSL | No RSL | | pg/g | NA | NA | -- | -- | NA | NA | 7.21 | 7.9 | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN | No RSL | No RSL | | pg/g | NA | NA | -- | -- | NA | NA | 5.16 | 4.46 | NA | NA | NA | NA | NA | NA |
| 2,3,4,6,7,8-HXCDF | No RSL | No RSL | | pg/g | NA | NA | -- | 2.04 J | NA | NA | 13 | 12.8 | NA | NA | NA | NA | NA | NA |
| 2,3,4,7,8-PECDF | No RSL | No RSL | | pg/g | NA | NA | 1.69 J | 1.65 J | NA | NA | 13.9 | 13.7 | NA | NA | NA | NA | NA | NA |
| 2,3,7,8-TCDD | 4.8 | 22 | | pg/g | NA | NA | -- | -- | NA | NA | 1.38 | 1.2 | NA | NA | NA | NA | NA | NA |
| 2,3,7,8-TETRACHLORODIBENZOFURAN | No RSL | No RSL | | pg/g | NA | NA | 2.3 J | 2.5 J | NA | NA | 12.7 | 14.1 J | NA | NA | NA | NA | NA | NA |
| OCDD | No RSL | No RSL | | pg/g | NA | NA | 2960 J | 3750 J | NA | NA | 12600 J | 8950 J | NA | NA | NA | NA | NA | NA |
| OCDF | No RSL | No RSL | | pg/g | NA | NA | 6.4 J | 10.3 | NA | NA | 24.1 | 22 | NA | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0 | 4.8 | 22 | | pg/g | NA | NA | 2.37 | 3.45 | NA | NA | **25.8** | **22.5** | NA | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0.5 | 4.8 | 22 | | pg/g | NA | NA | 3.87 | 4.69 | NA | NA | **25.8** | **22.5** | NA | NA | NA | NA | NA | NA |
| **Metals** | | | | | | | | | | | | | | | | | | |
| ALUMINUM | 7,700 | 110,000 | 13,900 | mg/kg | **11000** | **8200** | ***17000*** | ***20000*** | 13000 | 12000 | 11000 | 11000 | ***16000*** | 6400 | ***27000*** | ***26000*** | ***37000*** | ***14000*** |
| ANTIMONY | 3.1 | 47 | -- | mg/kg | **170** | **10 J** | **2.5 J** | **3.6 J** | 0.73 J | -- | **6.8 J** | 2.8 J | **510** | -- | **9.9** | **30 J** | **8.5 J** | -- |
| ARSENIC | 0.68 | 3 | 14 | mg/kg | ***52*** | ***18*** | **9.7 J** | **8.5** | **4.1** | **3.8** | **8.4** | **4.7** | ***23*** | **2.8 J** | **3.5** | ***31 J*** | **9.3 J** | **2.6 J** |
| BARIUM | 1,500 | 22,000 | 114 | mg/kg | *320* | *180* | 64 | 62 | 62 | 58 | *710 J* | *280 J* | *330* | 21 | *120* | 86 | 89 | 62 |
| BERYLLIUM | 16 | 230 | 1.2 | mg/kg | -- | 0.22 J | 0.34 J | 0.41 J | 0.36 J | 0.37 | -- | -- | -- | 0.19 J | 0.18 J | 0.45 J | 0.58 J | 0.28 |
| CADMIUM | 7.1 | 98 | 0.84 | mg/kg | ***12*** | ***9.4*** | *5.3* | ***7.4*** | *0.62* | *0.24 J* | *3.4* | *1.1* | ***33*** | 0.61 J | ***19*** | ***17*** | ***24*** | 0.027 J |
| CALCIUM | No RSL | No RSL | 1,390 | mg/kg | *20000* | *6800* | *2200* | *2500* | 790 | 600 | *5300 J* | *1700 J* | *10000* | -- | *1700* | *1600 J* | *1800 J* | 1100 |
| CHROMIUM | 0.3 | 6.3 | 18 | mg/kg | ***94*** | ***58*** | ***39*** | ***58*** | **17** | **12** | ***58*** | **17** | ***81*** | **8.6** | ***55*** | ***88 J*** | ***140 J*** | **13** |
| COBALT | 2.3 | 35 | 7.3 | mg/kg | ***28*** | ***11*** | **3.2 J** | **3 J** | **4.1** | **3.2** | ***15*** | **4.1** | ***14*** | **2.5 J** | **2.7** | ***16*** | ***7.3 J*** | **3.1** |
| COPPER | 310 | 4,700 | 33 | mg/kg | ***1700*** | ***330*** | ***740*** | ***1200*** | *69* | 18 | *180 J* | *56 J* | ***720*** | 27 | ***2400*** | ***6700*** | ***4200*** | 6.5 |
| IRON | 5,500 | 82,000 | 10,900 | mg/kg | ***250000*** | ***140000*** | 8900 | ***11000*** | ***14000*** | **8400** | ***160000*** | ***20000*** | ***82000*** | ***20000*** | **7100** | ***160000 J*** | ***14000 J*** | **9900** |
| LEAD | 400 | 800 | 124 | mg/kg | ***3400*** | *520* | *190* | *310* | 47 | 15 | *250* | *190* | ***22000*** | 30 | ***770*** | ***780 J*** | ***680 J*** | 6 |
| MAGNESIUM | No RSL | No RSL | 1,450 | mg/kg | *2200* | 1200 | 1400 | *1500* | 1200 | 1100 | 1200 J | 950 | 2100 | 610 J | 1200 | *1800 J* | *2500 J* | 1100 |
| MANGANESE | 180 | 2,600 | 781 | mg/kg | ***1600*** | **640** | 140 | **210** | **280** | **260** | **980 J** | **330 J** | **710** | **160** | **270** | **710 J** | **360 J** | **220** |
| MERCURY | 1.1 | 4.6 | 0.25 | mg/kg | *0.25* | 0.11 | 0.19 | 0.22 | 0.039 J | 0.052 J | 0.047 J | 0.045 J | 0.078 J | 0.01 J | *0.25* | 0.13 | 0.063 J | -- |
| NICKEL | 150 | 2,200 | 11 | mg/kg | *120* | *110* | *27 J* | *50 J* | *11* | 6.6 | *35* | *14* | *47* | 6.4 J | *22* | *94 J* | *81 J* | 7.6 |
| POTASSIUM | No RSL | No RSL | 756 | mg/kg | 720 | 410 J | 590 J | 500 J | 510 J | 550 | 430 | 390 | -- | -- | 420 | -- | -- | 690 |
| SELENIUM | 39 | 580 | 1.4 | mg/kg | -- | 1.2 J | -- | *1.5 J* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| SILVER | 39 | 580 | 0.3 | mg/kg | *4.3* | *19* | *5.1* | *8.6* | -- | -- | *15* | *4.6* | *9* | -- | *13* | *16* | *24* | -- |
| SODIUM | No RSL | No RSL | 31 | mg/kg | *410 J* | *110 J* | *80 J* | *80 J* | *62 J* | *77 J* | *130 J* | *75 J* | *150 J* | -- | *63 J* | -- | -- | *46 J* |
| VANADIUM | 39 | 580 | 29 | mg/kg | 22 | 15 | 17 | 15 | 18 | 16 | 15 J | 14 | 16 | 9.2 J | 11 | 25 | 21 | 21 |
| ZINC | 2,300 | 35,000 | 104 | mg/kg | *2200* | *1900* | *310 J* | *320 J* | *160* | 26 | *430 J* | *160 J* | ***5400*** | 60 | *600* | *1100* | *950* | 20 |

**Notes:**
- Screening levels include the EPA Regional Screeening Levels (RSL) for Residential and Industrial Soil (EPA May 2021) and Molena soil Maximum detected concentration (Tetra Tech 2021).
- Bolded values exceed the Residential RSL; shaded cells indicate exceedance of the Industrial RSL.; italicized and underlined values exceed the Site-specfic soil screening levels

FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
N = normal field samples
NA = not analyzed
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
WHO = World Health Organization
µg/kg = micrograms per kilogram
"-" = Not detected

# Table 4-4
# Temporary Well Groundwater Analytical Data - Project 15 CDL
# Supplemental Field Investigation
# Wallops Island, Virginia

| Analyte | CAS # | EPA RSL Tapwater | Wallops Groundater Maximum Background Detection | Virginia Groundwater Quality Standards | Units | Location | DPW1 | DPW2 | DPW3 | DPW3 | DPW4 | DPW4 | DPW5 | DPW6 | DPW7 | DPW8 | DPW8 | DPW9 | DPW10 | DPW11 | DPW12 | DPW13 | DPW14 | DPW14 | DPW15 | DPW16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sample # | CDL-DPW01-00-3039 | CDL-DPW02-00-2130 | CDL-DPW03-00-1120 | CDL-DPW03-01-1120 | CDL-DPW04-00-1928 | CDL-DPW04-01-1928 | CDL-DPW05-00-2736 | CDL-DPW06-00-1130 | CDL-DPW07-1130 | CDL-DPW08-00-1130 | CDL-DPW08-01-1130 | CDL-DPW09-00-4150 | CDL-DPW10-00-1726 | CDL-DPW11-00-2130 | CDL-DPW12-00-2332 | CDL-DPW13-00-3544 | CDL-DPW14-00-3140 | CDL-DPW14-01-3140 | CDL-DPW15-00-3140 | CDL-DPW16-00-2130 |
| | | | | | | Sample Type | N | N | N | FD | N | FD | N | N | N | N | FD | N | N | N | N | N | N | FD | N | N |
| | | | | | | Parent Sample # | | | | CDL-DPW03-00-1120 | | CDL-DPW04-00-1928 | | | | | CDL-DPW08-00-1130 | | | | | | CDL-DPW14-00-3140 | | |
| | | | | | | Start Depth | 14.5 | 10 | 5 | 5 | 9 | 9 | 13 | 5 | 5 | 5 | 5 | 20 | 8 | 10 | 11 | 17 | 10 | 10 | 15 | 10 |
| | | | | | | End Depth | 19.5 | 15 | 10 | 10 | 14 | 14 | 18 | 15 | 15 | 15 | 15 | 25 | 13 | 15 | 16 | 22 | 15 | 15 | 20 | 15 |
| | | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | | Sample Date | 7/21/2015 | 7/22/2015 | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/23/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/23/2015 | 7/21/2015 | 7/27/2015 | 5/6/2016 | 5/4/2016 | 5/5/2016 | 5/5/2016 | 5/5/2016 | 5/4/2016 |
| | | | | | | | | T | T | T | T | D | T | T | T | T | T | T | T | T | D | T | T | T | T | T |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2-DICHLOROETHANE | 107-06-2 | 0.17 | -- | -- | ug/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ACETONE | 67-64-1 | 1,400 | -- | -- | ug/l | | -- | -- | -- | -- | -- | -- | -- | -- | 6.3 J | -- | NA | 2.4 J | -- | 9 J | -- | -- | -- | -- | -- | -- |
| BENZENE | 71-43-2 | 0.46 | -- | -- | ug/l | | **1400** | **2100** | **160** | **110** | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CARBON DISULFIDE | 75-15-0 | 81 | -- | -- | ug/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CHLOROFORM | 67-66-3 | 0.22 | 2 | -- | ug/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CIS-1,2-DICHLOROETHENE | 156-59-2 | 3.6 | 1 | -- | ug/l | | -- | ***18 J*** | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | 0.37 J | -- | -- | -- | -- | -- | -- |
| CYCLOHEXANE | 110-82-7 | 1,300 | -- | -- | ug/l | | 440 | 420 | 290 | 300 | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | 490 | 360 | -- | -- |
| ETHYLBENZENE | 100-41-4 | 1.5 | -- | -- | ug/l | | **490** | **74** | **1300** | **1300** | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | **630** | **610** | -- | -- |
| ISOPROPYLBENZENE | 98-82-8 | 45 | -- | -- | ug/l | | **51 J** | **49 J** | **91** | **86** | -- | -- | 7.1 J | -- | -- | -- | NA | -- | -- | -- | -- | -- | **53** | **56** | -- | -- |
| METHYLCYCLOHEXANE | 108-87-2 | -- | -- | -- | ug/l | | 300 J | 170 J | 110 J | 100 J | -- | -- | 100 | -- | -- | -- | NA | -- | -- | -- | -- | 1.8 J | 440 | 330 | -- | -- |
| STYRENE | 100-42-5 | 120 | -- | -- | ug/l | | 21 J | -- | 9.5 J | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| TETRACHLOROETHENE | 127-18-4 | 4.1 | 10 | -- | ug/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | ***14 J*** | ***14 J*** | -- | -- |
| TOLUENE | 108-88-3 | 110 | -- | -- | ug/l | | **9800** | 14 J | **390 J** | **550 J** | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | **1100** | **990** | -- | -- |
| XYLENES (TOTAL) | 1330-20-7 | 19 | -- | -- | ug/l | | **2700** | **2400** | **4800** | **4500** | -- | -- | **40** | -- | -- | -- | NA | -- | -- | -- | -- | -- | **3900** | **3800** | -- | -- |
| **Semi-volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 0.083 | -- | -- | ug/l | | **4** | **2.4** | **5.5** | **5.4** | -- | -- | 1.1 | -- | -- | -- | NA | -- | -- | -- | -- | -- | **3.7 J** | **3.1 J** | -- | -- |
| 2-METHYLNAPHTHALENE | 91-57-6 | 3.6 | -- | -- | ug/l | | **38** | **15** | **68** | **71** | -- | -- | **12** | -- | -- | -- | NA | -- | 0.13 J | -- | -- | -- | **45** | **38** | 0.065 J | -- |
| 2-METHYLPHENOL | 95-48-7 | 93 | -- | -- | ug/l | | 7.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| ACENAPHTHENE | 83-32-9 | 53 | -- | -- | ug/l | | 3.6 | 1.4 | -- | -- | -- | -- | 0.18 J | -- | -- | -- | NA | -- | -- | -- | -- | -- | 0.34 J | 0.29 J | -- | -- |
| ANTHRACENE | 120-12-7 | 180 | -- | -- | ug/l | | 1.6 J | -- | -- | -- | -- | -- | 0.073 J | -- | -- | -- | NA | -- | -- | -- | -- | -- | 0.073 J | -- | -- | -- |
| BENZO(A)ANTHRACENE | 56-55-3 | 0.03 | -- | -- | ug/l | | **0.55** | -- | -- | -- | -- | -- | **0.13 J** | -- | **0.19 J** | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(A)PYRENE | 50-32-8 | 0.025 | -- | -- | ug/l | | **0.34 J** | -- | -- | -- | -- | -- | -- | -- | **0.088 J** | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(B)FLUORANTHENE | 205-99-2 | 0.25 | -- | -- | ug/l | | **0.32** | -- | -- | -- | -- | -- | -- | -- | 0.11 J | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(G,H,I)PERYLENE | 191-24-2 | -- | -- | -- | ug/l | | 0.14 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(K)FLUORANTHENE | 207-08-9 | 2.5 | -- | -- | ug/l | | 0.17 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| BIS(2-ETHYLHEXYL)PHTHALATE | 117-81-7 | 5.6 | -- | -- | ug/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CAPROLACTAM | 105-60-2 | 990 | -- | -- | ug/l | | -- | -- | -- | -- | -- | -- | 1.3 J | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CARBAZOLE | 86-74-8 | -- | -- | -- | ug/l | | 9.1 J | 7.2 J | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CHRYSENE | 218-01-9 | 25 | -- | -- | ug/l | | 0.33 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| CRESOLS, M & P | MEPH1314 | 93 | -- | -- | ug/l | | 25 | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | 0.76 J | 0.77 J | -- | -- |
| DIBENZOFURAN | 132-64-9 | 0.79 | | -- | ug/l | | **3.6** | **1.3** | -- | -- | -- | -- | 0.32 J | -- | -- | -- | NA | -- | -- | -- | -- | -- | 0.67 J | 0.62 J | -- | -- |
| FLUORANTHENE | 206-44-0 | 80 | -- | -- | ug/l | | 2 | -- | -- | -- | -- | -- | -- | -- | 0.16 J | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| FLUORENE | 86-73-7 | 29 | -- | -- | ug/l | | 3.9 | 1 | 1.4 J | -- | -- | -- | 0.39 | -- | -- | -- | NA | -- | -- | -- | -- | -- | 0.59 J | 0.55 J | -- | -- |
| INDENO(1,2,3-CD)PYRENE | 193-39-5 | 0.25 | -- | -- | ug/l | | 0.13 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| NAPHTHALENE | 91-20-3 | 0.12 | -- | -- | ug/l | | **61** | **38** | **120** | **120** | -- | -- | **5.3** | **0.53** | -- | -- | NA | -- | **0.22** | -- | -- | -- | **58** | **51** | **0.12 J** | -- |
| PAH, HMW Total | HPAH | -- | -- | -- | ug/l | | 5.58 | -- | -- | -- | -- | -- | 0.13 | -- | 0.678 | -- | NA | -- | -- | -- | -- | -- | 0.14 | 0.14 | -- | -- |
| PAH, LMW Total | LPAH | -- | -- | -- | ug/l | | 76.9 | 41.03 | 121.4 | 120 | -- | -- | 6.183 | 0.53 | 0.075 | -- | NA | -- | 0.22 | -- | -- | -- | 59.513 | 52.36 | 0.12 | -- |
| PHENANTHRENE | 85-01-8 | -- | -- | -- | ug/l | | 6.8 | 0.63 | -- | -- | -- | -- | 0.24 | -- | 0.075 J | -- | NA | -- | -- | -- | -- | -- | 0.51 J | 0.52 J | -- | -- |
| PHENOL | 108-95-2 | 580 | -- | -- | ug/l | | 3.6 | 19 | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| PYRENE | 129-00-0 | 12 | -- | -- | ug/l | | 1.6 | -- | -- | -- | -- | -- | -- | -- | 0.13 J | -- | NA | -- | -- | -- | -- | -- | 0.14 J | 0.14 J | -- | -- |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN | 35822-46-9 | 13 | -- | -- | pg/l | | NA | NA | NA | NA | -- | NA | NA | NA | NA | -- | -- | NA | NA | NA | NA | NA | NA | NA | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | -- | -- | -- | pg/l | | NA | NA | NA | NA | -- | NA | NA | NA | NA | -- | -- | NA | NA | NA | NA | NA | NA | NA | -- | -- |
| 2,3,7,8-TETRACHLORODIBENZOFURAN | 51207-31-9 | 1.2 | -- | | pg/l | | NA | NA | NA | NA | -- | NA | NA | NA | NA | -- | -- | NA | NA | NA | NA | NA | NA | NA | -- | -- |
| OCDD | 3268-87-9 | -- | -- | -- | pg/l | | NA | NA | NA | NA | 140 J | NA | NA | NA | NA | 206 | 177 | NA | NA | NA | NA | NA | NA | NA | 47.4 J | 150 |
| OCDF | 39001-02-0 | -- | -- | -- | pg/l | | NA | NA | NA | NA | -- | NA | NA | NA | NA | -- | -- | NA | NA | NA | NA | NA | NA | NA | -- | -- |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 1.2 | -- | -- | pg/l | | NA | NA | NA | NA | 0.042 | NA | NA | NA | NA | 0.0619 | 0.0531 | NA | NA | NA | NA | NA | NA | NA | 0.0142 | 0.0451 |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 1.2 | -- | -- | pg/l | | NA | NA | NA | NA | **19.9** | NA | NA | NA | NA | **21** | **21** | NA | NA | NA | NA | NA | NA | NA | **20.7** | **20.5** |
| **Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ARSENIC | 7440-38-2 | 0.000052 | 0.018 | 0.05 | mg/l | | **0.0055 J** | **--** | **0.0043 J** | **0.0028 J** | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | **0.0022 J** | -- | -- |
| BARIUM | 7440-39-3 | 0.38 | 0.221 | 1.0 | mg/l | | 0.036 | **0.05** | 0.032 | 0.034 | 0.005 J | 0.005 J | 0.0084 J | 0.0086 J | **0.19** | 0.017 J | NA | 0.012 J | 0.01 J | **0.15** | 0.019 J | 0.023 J | 0.0086 J | 0.024 J | 0.019 J | 0.0076 J |
| CALCIUM | 7440-70-2 | -- | 30 | -- | mg/l | | 14 | *55* | 27 | *30* | 25 | 24 | 18 | 25 | *49* | *35* | NA | *44* | 20 | *100* | *30* | *32* | 17 | 19 | *30* | 20 |
| CHROMIUM | 7440-47-3 | 0.000035 | 0.046 | 0.05 | mg/l | | -- | -- | **0.00081 J** | **0.00078 J** | **0.019** | **0.021** | -- | -- | -- | -- | NA | -- | -- | **0.0018 J** | -- | -- | -- | -- | -- | -- |
| COBALT | 7440-48-4 | 0.00060 | 0.019 | -- | mg/l | | -- | -- | -- | -- | -- | -- | -- | -- | **0.0016 J** | -- | NA | -- | -- | **0.0017 J** | -- | -- | -- | -- | -- | -- |
| COPPER | 7440-50-8 | 0.08 | 0.015 | 1.0 | mg/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | -- | -- | -- | 0.0021 J | -- |
| IRON | 7439-89-6 | 1,400 | 50 | -- | mg/l | | 12 | 4.1 | 37 | 32 | -- | -- | 2 | -- | -- | -- | NA | 0.87 | 0.19 | 0.12 | 0.065 J | 1 | 6.3 | 6.4 | -- | -- |
| LEAD | 7439-92-1 | 0.015 | 0.013 | 0.05 | mg/l | | 0.0062 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | NA | -- | -- | -- | -- | 0.0055 J | 0.0087 J | 0.0073 J | -- | -- |
| MAGNESIUM | 7439-95-4 | -- | 13 | -- | mg/l | | 1.8 J | 8.9 | 1.8 J | 1.9 J | 1.1 J | 1.1 J | 0.85 J | 1.7 J | 12 | 4.7 J | NA | 2.1 J | 1.2 J | 7.5 | 1.4 J | 1.5 J | 1.2 J | 1.3 J | 1.5 J | 5.9 |
| MANGANESE | 7439-96-5 | 0.043 | 3.1 | -- | mg/l | | **0.59** | **1.6** | **1.3** | **1.3** | 0.014 J | 0.016 | 0.028 | 0.039 | **0.64** | **0.13** | NA | **0.28** | **0.083** | ***3.2*** | 0.041 | **0.12** | 0.029 | 0.037 | 0.03 | **0.12** |
| MERCURY | 7439-97-6 | 0.000063 | -- | 0.00005 | mg/l | | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.2E-05 J | NA | 2.9E-05 J | -- | -- | -- | 7.8E-05 J | -- | -- | -- | -- |
| NICKEL | 7440-02-0 | 0.039 | 0.015 | -- | mg/l | | -- | 0.0094 J | -- | -- | -- | -- | -- | -- | 0.0065 J | -- | NA | 0.0051 J | 0.0029 J | -- | -- | -- | -- | -- | -- | -- |
| POTASSIUM | 7440-09-7 | -- | 8 | -- | mg/l | | 2.6 J | 6 | 2.2 J | 2.4 J | 0.42 J | 0.47 J | 0.43 J | 2.4 J | 5.5 | 2.6 J | NA | 1.3 J | 1.1 J | 3.9 J | 0.62 J | 1.6 J | 1.2 J | 1.2 J | 0.71 J | 1.7 J |
| SODIUM | 7440-23-5 | -- | 18 | 270 | mg/l | | 6.3 | 13 | 13 | 13 | 5.4 | 5.8 | 3.8 J | 4.7 J | *23* | 11 | NA | 6 | 9.5 | 9.9 | 5 | 5.3 | 5.5 | 5.7 | 6 | 5 |
| ZINC | 7440-66-6 | 0.6 | 0.085 | 0.05 | mg/l | | -- | 0.028 J | -- | -- | -- | -- | -- | NA | *0.13* | -- | NA | 0.08 | *0.13* | 0.0064 J | -- | 0.0036 J | -- | -- | -- | 0.051 |

**Notes:**
- Groundwater samples from temporary wells analyzed for metals were filtered in the field per the approved work plan.
- Screening levels include the EPA Regional Screeening Levels (RSL) for Tapwater (for non-carcinogens 0.1 times the RSL is listed) (EPA May 2021); Wallops Groundwater Maximum Background Detection (Tetra Tech 2021); Virginia Groundwater Quality Standards (Virginia Administartive Code 9VAC25-280-40).
- Bolded values exceed EPA RSLs, underlined and italicized values exceed Site Background screening levels and shaded cells indicated exceedance of Virginia Groundwater Criteria.

FD = field duplicate
ft btic = feet below top of inner casing
HMW = high molecular weight
J = analyte was positively identified, but value is estimated
LMW = low molecular weight
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
OCCD = Octachlorodibenzodioxin
OCDF = Octachlorodibnezofuran
"-" = Not detected
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
WHO = World Health Organization
µg/l = micrograms per liter

# Table 4-4
# Temporary Well Groundwater Analytical Data - Project 15 CDL
# Supplemental Field Investigation
# Wallops Island, Virginia

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Location | DPW16 | DPW17 | DTW1 | DTW1 | DTW2 | DTW3 | DTW4 |
| | | | | | Sample # | CDL-DPW16-01-2130 | CDL-DPW17-00-1928 | CDL-DTW1-00-119128 | CDL-DTW1-01-119128 | CDL-DTW2-00-107116 | CDL-DTW3-00-097106 | CDL-DTW4-00-101110 |
| | | | | | Sample Type | FD | N | N | FD | N | N | N |
| | | | | | Parent Sample # | CDL-DPW16-00-2130 | | | CDL-DTW1-00-119128 | | | |
| | | | | | Start Depth | 10 | 9 | 59 | 59 | 52 | 47 | 50 |
| | | | | | End Depth | 15 | 14 | 64 | 64 | 57 | 52 | 55 |
| | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | Sample Date | 5/4/2016 | 5/10/2016 | 8/19/2016 | 8/19/2016 | 8/26/2016 | 8/26/2016 | 8/17/2016 |
| | | | | | | T | T | T | T | T | T | T |
| Analyte | CAS # | EPA RSL Tapwater | Wallops Groundater Maximum Background Detection | Virginia Groundwater Quality Standards | Units | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | |
| 1,2-DICHLOROETHANE | 107-06-2 | 0.17 | -- | -- | ug/l | -- | 0.2 J | -- | -- | -- | -- | -- |
| ACETONE | 67-64-1 | 1,400 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | 4.3 J |
| BENZENE | 71-43-2 | 0.46 | -- | -- | ug/l | -- | -- | **0.89 J** | **0.77 J** | -- | -- | -- |
| CARBON DISULFIDE | 75-15-0 | 81 | -- | -- | ug/l | -- | -- | -- | -- | 0.44 J | -- | -- |
| CHLOROFORM | 67-66-3 | 0.22 | 2 | -- | ug/l | -- | -- | -- | -- | **0.72 J** | -- | -- |
| CIS-1,2-DICHLOROETHENE | 156-59-2 | 3.6 | 1 | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| CYCLOHEXANE | 110-82-7 | 1,300 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| ETHYLBENZENE | 100-41-4 | 1.5 | -- | -- | ug/l | -- | -- | **2.9** | **3.1** | -- | -- | -- |
| ISOPROPYLBENZENE | 98-82-8 | 45 | -- | -- | ug/l | -- | -- | 0.47 J | 0.5 J | -- | -- | -- |
| METHYLCYCLOHEXANE | 108-87-2 | -- | -- | -- | ug/l | -- | -- | 12 | 13 | -- | -- | -- |
| STYRENE | 100-42-5 | 120 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| TETRACHLOROETHENE | 127-18-4 | 4.1 | 10 | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| TOLUENE | 108-88-3 | 110 | -- | -- | ug/l | -- | -- | 6.6 | 6.5 | -- | -- | **150** |
| XYLENES (TOTAL) | 1330-20-7 | 19 | -- | -- | ug/l | -- | -- | 14 | 15 | -- | -- | -- |
| **Semi-volatile Organic Compounds** | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 0.083 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| 2-METHYLNAPHTHALENE | 91-57-6 | 3.6 | -- | -- | ug/l | -- | -- | 1.6 | 1.5 J | -- | -- | -- |
| 2-METHYLPHENOL | 95-48-7 | 93 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | 0.63 J |
| ACENAPHTHENE | 83-32-9 | 53 | -- | -- | ug/l | -- | -- | 0.21 | 0.19 J | -- | -- | -- |
| ANTHRACENE | 120-12-7 | 180 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| BENZO(A)ANTHRACENE | 56-55-3 | 0.03 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| BENZO(A)PYRENE | 50-32-8 | 0.025 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| BENZO(B)FLUORANTHENE | 205-99-2 | 0.25 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| BENZO(G,H,I)PERYLENE | 191-24-2 | -- | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| BENZO(K)FLUORANTHENE | 207-08-9 | 2.5 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| BIS(2-ETHYLHEXYL)PHTHALATE | 117-81-7 | 5.6 | -- | -- | ug/l | -- | -- | 1 J | 0.44 J | -- | -- | 0.7 J |
| CAPROLACTAM | 105-60-2 | 990 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| CARBAZOLE | 86-74-8 | -- | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| CHRYSENE | 218-01-9 | 25 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| CRESOLS, M & P | MEPH1314 | 93 | -- | -- | ug/l | -- | -- | 0.51 J | -- | -- | -- | 1.2 J |
| DIBENZOFURAN | 132-64-9 | 0.79 | | -- | ug/l | -- | -- | 0.19 J | -- | -- | -- | -- |
| FLUORANTHENE | 206-44-0 | 80 | -- | -- | ug/l | -- | -- | 0.1 J | -- | -- | -- | -- |
| FLUORENE | 86-73-7 | 29 | -- | -- | ug/l | -- | -- | -- | 0.23 J | -- | -- | -- |
| INDENO(1,2,3-CD)PYRENE | 193-39-5 | 0.25 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| NAPHTHALENE | 91-20-3 | 0.12 | -- | -- | ug/l | -- | -- | **1.7** | **1.7 J** | -- | -- | -- |
| PAH, HMW Total | HPAH | -- | -- | -- | ug/l | -- | -- | 0.193 | -- | -- | -- | -- |
| PAH, LMW Total | LPAH | -- | -- | -- | ug/l | -- | -- | 2.48 | 2.59 | -- | -- | -- |
| PHENANTHRENE | 85-01-8 | -- | -- | -- | ug/l | -- | -- | 0.57 | 0.47 J | -- | -- | -- |
| PHENOL | 108-95-2 | 580 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | 13 |
| PYRENE | 129-00-0 | 12 | -- | -- | ug/l | -- | -- | 0.093 J | -- | -- | -- | -- |
| **Dioxins/Furans** | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN | 35822-46-9 | 13 | -- | -- | pg/l | -- | -- | -- | -- | **71.4** | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | -- | -- | -- | pg/l | -- | -- | -- | -- | 41.2 J | -- | -- |
| 2,3,7,8-TETRACHLORODIBENZOFURAN | 51207-31-9 | 1.2 | -- | | pg/l | -- | -- | -- | -- | **4 J** | -- | -- |
| OCDD | 3268-87-9 | -- | -- | -- | pg/l | -- | 37.4 J | 95.2 J | 441 | 1470 J | -- | -- |
| OCDF | 39001-02-0 | -- | -- | -- | pg/l | -- | -- | -- | -- | 58.6 J | -- | -- |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 1.2 | -- | -- | pg/l | -- | 0.0112 | 0.0286 | 0.132 | **1.98** | -- | -- |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 1.2 | -- | -- | pg/l | **21.3** | **20.6** | **19.8** | **20.1** | **22.4** | **21.6** | **21.6** |
| **Metals** | | | | | | | | | | | | |
| ARSENIC | 7440-38-2 | 0.000052 | 0.018 | 0.05 | mg/l | -- | -- | -- | -- | **0.0022 J** | -- | -- |
| BARIUM | 7440-39-3 | 0.38 | 0.221 | 1.0 | mg/l | 0.008 J | **0.038** | **0.041** | 0.036 | 0.025 | 0.018 J | 0.027 |
| CALCIUM | 7440-70-2 | -- | 30 | -- | mg/l | 21 | 53 | 18 | 16 | 12 | 12 | 20 |
| CHROMIUM | 7440-47-3 | 0.000035 | 0.046 | 0.05 | mg/l | -- | -- | -- | -- | -- | -- | -- |
| COBALT | 7440-48-4 | 0.00060 | 0.019 | -- | mg/l | -- | **0.0013 J** | **0.011 J** | **0.0096 J** | **0.0037 J** | **0.0023 J** | **0.011 J** |
| COPPER | 7440-50-8 | 0.08 | 0.015 | 1.0 | mg/l | -- | -- | -- | -- | -- | -- | -- |
| IRON | 7439-89-6 | 1.400 | 50 | -- | mg/l | -- | 1.4 | 9.8 | 8.6 | 0.34 | 0.1 | 8 |
| LEAD | 7439-92-1 | 0.015 | 0.013 | 0.05 | mg/l | -- | -- | -- | -- | -- | -- | -- |
| MAGNESIUM | 7439-95-4 | -- | 13 | -- | mg/l | 6.4 | 2.9 J | 5.4 | 4.8 J | -- | -- | 6.4 |
| MANGANESE | 7439-96-5 | 0.043 | 3.1 | -- | mg/l | **0.13** | **0.28** | **0.35** | **0.3** | **0.21** | **0.082** | **0.63** |
| MERCURY | 7439-97-6 | 0.000063 | -- | 0.00005 | mg/l | -- | -- | -- | -- | -- | -- | -- |
| NICKEL | 7440-02-0 | 0.039 | 0.015 | -- | mg/l | -- | -- | 0.021 J | 0.018 J | -- | -- | 0.0091 J |
| POTASSIUM | 7440-09-7 | -- | 8 | -- | mg/l | 1.8 J | 2.1 J | 2 J | 1.7 J | 2.3 J | 1 J | 2.8 J |
| SODIUM | 7440-23-5 | -- | 18 | 270 | mg/l | 5.4 | 6 | 12 | 11 | 13 | 10 | 13 |
| ZINC | 7440-66-6 | 0.6 | 0.085 | 0.05 | mg/l | 0.053 | 0.0096 J | 0.035 | 0.032 | -- | -- | 0.013 J |

**Notes:**
- Groundwater samples from temporary wells analyzed for metals were filtered in the field per the approved work plan.
- Screening levels include the EPA Regional Screeening Levels (RSL) for Tapwater (for non-carcinogens 0.1 times the RSL is listed) (EPA May 2021); Wallops Groundwater Maximum Background Detection (Tetra Tech 2021); Virginia Groundwater Quality Standards (Virginia Administartive Code 9VAC25-280-40).
- Bolded values exceed EPA RSLs, underlined and italicized values exceed Site Background screening levels and shaded cells indicated exceedance of Virginia Groundwater Criteria.

FD = field duplicate
ft btic = feet below top of inner casing
HMW = high molecular weight
J = analyte was positively identified, but value is estimated
LMW = low molecular weight
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
OCCD = Octachlorodibenzodioxin
OCDF = Octachlorodibnezofuran
"-" = Not detected
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
WHO = World Health Organization
µg/l = micrograms per liter

**Table 4-5**
**Monitoring and Water Supply Well Groundwater Analytical Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Location | MW-1 | MW-1 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-4 |
| | | | | | Sample # | CDL-MW1-00-047066 | CDL-MW1-00-047066-02 | CDL-MW2-00-029048 | CDL-MW2-00-029048-02 | CDL-MW3-00-007026 | CDL-MW3-00-007026-02 | CDL-MW3-01-007026-02 | CDL-MW4-00-009028 |
| | | | | | Sample Type | N | N | N | N | N | N | FD | N |
| | | | | | Parent Sample # | | | | | | | CDL-MW3-00-007026-02 | |
| | | | | | Start Depth | 23 | 23 | 14 | 14 | 3 | 3 | 3 | 4 |
| | | | | | End Depth | 33 | 33 | 24 | 24 | 13 | 13 | 13 | 14 |
| | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | Sample Date | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 |
| | | | | | Total (T)/Dissolved(D) | T | T | T | T | T | T | T | T |
| Analyte | CAS # | EPA RSL Tapwater | Wallops Groundater Maximum Background Detection | Virginia Groundwater Quality Standards | Units | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | |
| 1,2-DICHLOROETHANE | 107-06-2 | 0.17 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | -- |
| 4-Methyl-2-Pentanone (MIBK) | 108-10-1 | 630 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | 3.6 J |
| CHLOROETHANE | 75-00-3 | 2,100 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | -- |
| CIS-1,2-DICHLOROETHENE | 156-59-2 | 3.6 | 1.0 | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | ***22*** |
| CYCLOHEXANE | 110-82-7 | 1,300 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | 180 |
| ETHYLBENZENE | 100-41-4 | 1.5 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | **430** |
| ISOPROPYLBENZENE | 98-82-8 | 45 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | **56 J** |
| METHYLCYCLOHEXANE | 108-87-2 | -- | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | 99 |
| TETRACHLOROETHENE | 127-18-4 | 4.1 | 10 | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | 3.8 J |
| TOLUENE | 108-88-3 | 110 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | **670 J** |
| XYLENES (TOTAL) | 1330-20-7 | 19 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | NA | **2500** |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | |
| 1,1'-BIPHENYL | 92-52-4 | 0.083 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | **2.8** |
| 2,4-DIMETHYLPHENOL | 105-67-9 | 36 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-METHYLNAPHTHALENE | 91-57-6 | 3.6 | -- | -- | ug/l | -- | -- | -- | -- | 0.08 J | -- | -- | **39** |
| ACENAPHTHENE | 83-32-9 | 53 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | 0.32 |
| ANTHRACENE | 120-12-7 | 180 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(B)FLUORANTHENE | 205-99-2 | 0.25 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| BENZO(G,H,I)PERYLENE | 191-24-2 | -- | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| CHRYSENE | 218-01-9 | 25 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| CRESOLS, M & P | MEPH1314 | 93 & 190 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | 3.3 |
| FLUORANTHENE | 206-44-0 | 80 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| FLUORENE | 86-73-7 | 29 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | 0.44 |
| NAPHTHALENE | 91-20-3 | 0.12 | -- | -- | ug/l | -- | 0.083 J | -- | -- | 0.19 J | -- | -- | **72** |
| PAH, HMW Total | HPAH | -- | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| PAH, LMW Total | LPAH | -- | -- | -- | ug/l | -- | 0.083 | -- | -- | 0.19 | -- | -- | 72.91 |
| PHENANTHRENE | 85-01-8 | -- | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | 0.15 J |
| PYRENE | 129-00-0 | 12 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | -- |
| **Dioxin/Furans** | | | | | | | | | | | | | |
| OCDD | 3268-87-9 | -- | -- | -- | pg/l | NA | -- | NA | 354 | 338 | 458 | NA | 136 |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 1.2 | -- | -- | pg/l | NA | -- | NA | 0.106 | 0.101 | 0.137 | NA | 0.0407 |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 1.2 | -- | -- | pg/l | NA | 19.7 | NA | 19.5 | **21** | 19.9 | NA | **20.5** |

**Table 4-5**
**Monitoring and Water Supply Well Groundwater Analytical Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Location | MW-1 | MW-1 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-4 |
| | | | | | Sample # | CDL-MW1-00-047066 | CDL-MW1-00-047066-02 | CDL-MW2-00-029048 | CDL-MW2-00-029048-02 | CDL-MW3-00-007026 | CDL-MW3-00-007026-02 | CDL-MW3-01-007026-02 | CDL-MW4-00-009028 |
| | | | | | Sample Type | N | N | N | N | N | N | FD | N |
| | | | | | Parent Sample # | | | | | | | CDL-MW3-00-007026-02 | |
| | | | | | Start Depth | 23 | 23 | 14 | 14 | 3 | 3 | 3 | 4 |
| | | | | | End Depth | 33 | 33 | 24 | 24 | 13 | 13 | 13 | 14 |
| | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | Sample Date | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 |
| | | | | | Total (T)/Dissolved(D) | T | T | T | T | T | T | T | T |
| Analyte | CAS # | EPA RSL Tapwater | Wallops Groundater Maximum Background Detection | Virginia Groundwater Quality Standards | Units | | | | | | | | |
| **Metals** | | | | | | | | | | | | | |
| ALUMINUM | 7429-90-5 | 2 | 59 | -- | mg/l | 1.3 | 1.6 | **12** | **3.2** | 0.97 | **7.3** | **8.2** | -- |
| ARSENIC | 7440-38-2 | 0.000052 | 0.018 | 0.05 | mg/l | **0.0039 J** | **0.003 J** | **0.0039 J** | -- | -- | -- | -- | **0.0044 J** |
| BARIUM | 7440-39-3 | 0.38 | 0.221 | 1.0 | mg/l | 0.009 J | 0.012 J | 0.044 | 0.021 J | 0.0048 J | 0.02 J | 0.023 J | 0.025 |
| BERYLLIUM | 7440-41-7 | 0.0025 | 0.0019 | -- | mg/l | -- | -- | -- | -- | -- | -- | -- | -- |
| CADMIUM | 7440-43-9 | 0.00092 | 0.00042 | 0.0004 | mg/l | -- | -- | -- | -- | -- | -- | *0.0007 J* | -- |
| CALCIUM | 7440-70-2 | -- | 30 | -- | mg/l | 27 | 28 | 21 | 17 | 23 | 21 | 21 | *31* |
| CHROMIUM | 7440-47-3 | 0.000035 | 0.046 | 0.05 | mg/l | **0.0037 J** | -- | **0.015** | **0.0056 J** | **0.0017 J** | -- | **0.0094 J** | **0.0017 J** |
| COBALT | 7440-48-4 | 0.00060 | 0.019 | -- | mg/l | -- | -- | -- | -- | -- | -- | -- | -- |
| COPPER | 7440-50-8 | 0.08 | 0.015 | 1.0 | mg/l | -- | -- | 0.0036 J | 0.0028 J | 0.0027 J | *0.045* | *0.051* | -- |
| IRON | 7439-89-6 | 1.4 | 50 | -- | mg/l | 0.68 | 0.84 | **3.2** | **1.4** | 0.49 | **3.7** | **4.3** | **15** |
| LEAD | 7439-92-1 | 0.015 | 0.013 | 0.05 | mg/l | -- | -- | -- | -- | -- | -- | 0.005 J | 0.0056 J |
| MAGNESIUM | 7439-95-4 | -- | 13 | -- | mg/l | 1.5 J | 2 J | 2 J | 1.4 J | 2.8 J | 2.5 J | 2.5 J | 1.6 J |
| MANGANESE | 7439-96-5 | 0.043 | 3.1 | -- | mg/l | 0.0075 J | 0.008 J | 0.02 | 0.011 J | 0.0039 J | 0.018 | 0.021 | **0.22** |
| MERCURY | 7439-97-6 | 0.000063 | -- | 0.00005 | mg/l | -- | -- | -- | -- | -- | -- | 3.9E-05 J | -- |
| NICKEL | 7440-02-0 | 0.039 | 0.015 | -- | mg/l | -- | -- | 0.0056 J | 0.0028 J | -- | -- | -- | -- |
| POTASSIUM | 7440-09-7 | -- | 8 | -- | mg/l | 1 J | 1.3 J | 1.6 J | 1.6 J | 1.1 J | 1.5 J | 1.5 J | 1.5 J |
| SODIUM | 7440-23-5 | -- | 18 | 270 | mg/l | 4.4 J | 5.1 | 4.5 J | 4.5 J | 6 | 5.2 | 5.3 | *30* |
| VANADIUM | 7440-62-2 | 0.0086 | 0.070 | -- | mg/l | -- | -- | 0.0067 J | 0.0026 J | -- | 0.0073 J | 0.0077 J | -- |
| ZINC | 7440-66-6 | 0.6 | 0.085 | 0.05 | mg/l | 0.025 | 0.0092 J | 0.018 J | ***0.63*** | 0.0048 J | 0.01 J | 0.012 J | 0.0023 J |

**Notes:**
- Groundwater samples from monitoring and water supply wells wells analyzed for metals were not filtered in the field (i.e., total metals concentrations are reported).
- Screening levels include the EPA Regional Screeening Levels (RSL) for Tapwater (for non-carcinogens 0.1 times the RSL is listed) (EPA May 2021); Wallops Groundwater Maximum Background Detection (Tetra Tech 2021); Virginia Groundwater Quality Standards (Virginia Administrative Code 9VAC25-280-40).
- Bolded values exceed EPA RSLs, underlined and italicized values exceed Site Background screening levels and shadec cells indicated exceedance of Virginia Groundwater Criteria.

FD = field duplicate
ft btic = feet below top of inner casing
HMW = high molecular weight
J = analyte was positively identified, but value is estimated
LMW = low molecular weight
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
"-" = Not detected
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
WHO = World Health Organization
µg/l = micrograms per liter

**Table 4-5**
**Monitoring and Water Supply Well Groundwater Analytical Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Location | MW-4 | MW-4 | MW-4 | MW-5 | MW-5 | MW-6 | MW-6 |
| | | | | | Sample # | CDL-MW4-01-009028 | CDL-MW4-00-009028-02 | CDL-MW4-01-009028-02 | CDL-MW5-00-009028 | CDL-MW5-00-009028-02 | CDL-MW6-00-023042 | CDL-MW6-00-023042-02 |
| | | | | | Sample Type | FD | N | FD | N | N | N | N |
| | | | | | Parent Sample # | CDL-MW4-00-009028 | | CDL-MW4-00-009028-02 | | | | |
| | | | | | Start Depth | 4 | 4 | 4 | 23 | 23 | 11 | 11 |
| | | | | | End Depth | 14 | 14 | 14 | 33 | 33 | 21 | 21 |
| | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | Sample Date | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| | | | | | Total (T)/Dissolved(D) | T | T | T | T | T | T | T |
| Analyte | CAS # | EPA RSL Tapwater | Wallops Groundater Maximum Background Detection | Virginia Groundwater Quality Standards | Units | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | |
| 1,2-DICHLOROETHANE | 107-06-2 | 0.17 | -- | -- | ug/l | -- | -- | -- | **0.59 J** | -- | -- | -- |
| 4-Methyl-2-Pentanone (MIBK) | 108-10-1 | 630 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| CHLOROETHANE | 75-00-3 | 2,100 | -- | -- | ug/l | 4.4 J | -- | -- | -- | -- | -- | -- |
| CIS-1,2-DICHLOROETHENE | 156-59-2 | 3.6 | 1.0 | -- | ug/l | ***21*** | ***22 J*** | -- | -- | -- | -- | -- |
| CYCLOHEXANE | 110-82-7 | 1,300 | -- | -- | ug/l | 190 | 330 | 330 | -- | -- | -- | -- |
| ETHYLBENZENE | 100-41-4 | 1.5 | -- | -- | ug/l | **450** | **580** | **600** | -- | -- | -- | -- |
| ISOPROPYLBENZENE | 98-82-8 | 45 | -- | -- | ug/l | **60 J** | **80** | **83** | -- | -- | -- | -- |
| METHYLCYLOHEXANE | 108-87-2 | -- | -- | -- | ug/l | 110 | 200 J | 210 J | -- | -- | -- | -- |
| TETRACHLOROETHENE | 127-18-4 | 4.1 | 10 | -- | ug/l | 3.6 J | -- | -- | -- | -- | -- | -- |
| TOLUENE | 108-88-3 | 110 | -- | -- | ug/l | **650 J** | **540** | **570** | -- | -- | -- | -- |
| XYLENES (TOTAL) | 1330-20-7 | 19 | -- | -- | ug/l | **2600** | **3400** | **3500** | -- | -- | -- | -- |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | |
| 1,1'-BIPHENYL | 92-52-4 | 0.083 | -- | -- | ug/l | **2.8** | **3.3 J** | **3.2 J** | -- | -- | -- | -- |
| 2,4-DIMETHYLPHENOL | 105-67-9 | 36 | -- | -- | ug/l | -- | -- | 1.9 J | -- | -- | -- | -- |
| 2-METHYLNAPHTHALENE | 91-57-6 | 3.6 | -- | -- | ug/l | **48** | **59** | **57** | -- | -- | -- | -- |
| ACENAPHTHENE | 83-32-9 | 53 | -- | -- | ug/l | -- | -- | -- | -- | 0.092 J | -- | -- |
| ANTHRACENE | 120-12-7 | 180 | -- | -- | ug/l | -- | -- | -- | -- | 0.069 J | -- | -- |
| BENZO(B)FLUORANTHENE | 205-99-2 | 0.25 | -- | -- | ug/l | -- | -- | -- | -- | 0.2 J | -- | -- |
| BENZO(G,H,I)PERYLENE | 191-24-2 | -- | -- | -- | ug/l | -- | -- | -- | -- | 0.047 J | -- | -- |
| CHRYSENE | 218-01-9 | 25 | -- | -- | ug/l | -- | -- | -- | -- | 0.068 J | -- | -- |
| CRESOLS, M & P | MEPH1314 | 93 & 190 | -- | -- | ug/l | 2.3 | -- | -- | -- | -- | -- | -- |
| FLUORANTHENE | 206-44-0 | 80 | -- | -- | ug/l | -- | -- | -- | 0.11 J | 0.24 J | -- | -- |
| FLUORENE | 86-73-7 | 29 | -- | -- | ug/l | -- | -- | -- | -- | -- | -- | -- |
| NAPHTHALENE | 91-20-3 | 0.12 | -- | -- | ug/l | **82** | **110** | **110** | -- | 0.063 J | -- | -- |
| PAH, HMW Total | HPAH | -- | -- | -- | ug/l | -- | -- | -- | 0.195 | 0.745 | -- | -- |
| PAH, LMW Total | LPAH | -- | -- | -- | ug/l | 82 | 110 | 110 | -- | 0.394 | -- | -- |
| PHENANTHRENE | 85-01-8 | -- | -- | -- | ug/l | -- | -- | -- | -- | 0.17 J | -- | -- |
| PYRENE | 129-00-0 | 12 | -- | -- | ug/l | -- | -- | -- | 0.085 J | 0.19 J | -- | -- |
| **Dioxin/Furans** | | | | | | | | | | | | |
| OCDD | 3268-87-9 | -- | -- | -- | pg/l | 118 | 166 | 123 | 312 | 285 | NA | 378 J |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 1.2 | -- | -- | pg/l | 0.0353 | 0.0498 | 0.037 | 0.0935 | 0.0855 | NA | 0.113 |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 1.2 | -- | -- | pg/l | **20.1** | **20.4** | **20.7** | **20.2** | **20.5** | NA | **19.8** |

**Table 4-5**
**Monitoring and Water Supply Well Groundwater Analytical Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Location | MW-4 | MW-4 | MW-4 | MW-5 | MW-5 | MW-6 | MW-6 |
| | | | | | Sample # | CDL-MW4-01-009028 | CDL-MW4-00-009028-02 | CDL-MW4-01-009028-02 | CDL-MW5-00-009028 | CDL-MW5-00-009028-02 | CDL-MW6-00-023042 | CDL-MW6-00-023042-02 |
| | | | | | Sample Type | FD | N | FD | N | N | N | N |
| | | | | | Parent Sample # | CDL-MW4-00-009028 | | CDL-MW4-00-009028-02 | | | | |
| | | | | | Start Depth | 4 | 4 | 4 | 23 | 23 | 11 | 11 |
| | | | | | End Depth | 14 | 14 | 14 | 33 | 33 | 21 | 21 |
| | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | Sample Date | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| | | | | | Total (T)/Dissolved(D) | T | T | T | T | T | T | T |
| Analyte | CAS # | EPA RSL Tapwater | Wallops Groundater Maximum Background Detection | Virginia Groundwater Quality Standards | Units | | | | | | | |
| **Metals** | | | | | | | | | | | | |
| ALUMINUM | 7429-90-5 | 2 | 59 | -- | mg/l | -- | -- | -- | 0.24 J | **55** | **9.1** | **11** |
| ARSENIC | 7440-38-2 | 0.000052 | 0.018 | 0.05 | mg/l | **0.0057 J** | **0.0058 J** | **0.0038 J** | **0.0068 J** | ***0.071*** | **0.007 J** | **0.0094 J** |
| BARIUM | 7440-39-3 | 0.38 | 0.221 | 1.0 | mg/l | 0.023 J | 0.013 J | 0.013 J | 0.093 | **0.89** | 0.034 | 0.042 |
| BERYLLIUM | 7440-41-7 | 0.0025 | 0.0019 | -- | mg/l | -- | -- | -- | -- | 0.0056 | -- | -- |
| CADMIUM | 7440-43-9 | 0.00092 | 0.00042 | 0.0004 | mg/l | -- | *0.0006 J* | -- | -- | ***0.005*** | -- | -- |
| CALCIUM | 7440-70-2 | -- | 30 | -- | mg/l | 29 | 19 | 19 | *110* | *150* | 23 | 22 |
| CHROMIUM | 7440-47-3 | 0.000035 | 0.046 | 0.05 | mg/l | **0.0026 J** | -- | -- | -- | **0.033** | **0.007 J** | -- |
| COBALT | 7440-48-4 | 0.00060 | 0.019 | -- | mg/l | -- | -- | -- | **0.0048 J** | ***0.042*** | **0.0015 J** | **0.0014 J** |
| COPPER | 7440-50-8 | 0.08 | 0.015 | 1.0 | mg/l | -- | -- | -- | -- | *0.03* | 0.0019 J | 0.0021 J |
| IRON | 7439-89-6 | 1.4 | 50 | -- | mg/l | **15** | **13** | **12** | **15** | ***100*** | **3.7** | **4.4** |
| LEAD | 7439-92-1 | 0.015 | 0.013 | 0.05 | mg/l | 0.0058 J | 0.0054 J | 0.0052 J | -- | ***0.14*** | -- | -- |
| MAGNESIUM | 7439-95-4 | -- | 13 | -- | mg/l | 1.7 J | 1.5 J | 1.5 J | 6.1 | *19* | 1.8 J | 2.2 J |
| MANGANESE | 7439-96-5 | 0.043 | 3.1 | -- | mg/l | **0.22** | **0.19** | **0.18** | **2.4** | ***4*** | **0.054** | **0.071** |
| MERCURY | 7439-97-6 | 0.000063 | -- | 0.00005 | mg/l | -- | -- | -- | -- | **0.0003** | -- | -- |
| NICKEL | 7440-02-0 | 0.039 | 0.015 | -- | mg/l | -- | -- | -- | -- | 0.0071 J | -- | -- |
| POTASSIUM | 7440-09-7 | -- | 8 | -- | mg/l | 1.4 J | 1.2 J | 1.1 J | 0.41 J | *9.8* | 0.91 J | 1.3 J |
| SODIUM | 7440-23-5 | -- | 18 | 270 | mg/l | *30* | *26* | *26* | *39* | *35* | 5.4 | 6 |
| VANADIUM | 7440-62-2 | 0.0086 | 0.070 | -- | mg/l | -- | -- | -- | -- | **0.059** | **0.0088 J** | **0.01 J** |
| ZINC | 7440-66-6 | 0.6 | 0.085 | 0.05 | mg/l | -- | -- | -- | 0.018 J | ***2.9*** | 0.011 J | 0.0091 J |

**Notes:**
- Groundwater samples from monitoring and water supply wells wells analyzed for metals were not filtered in the field (i.e., total metals concentrations are reported).
- Screening levels include the EPA Regional Screeening Levels (RSL) for Tapwater (for non-carcinogens 0.1 times the RSL is listed) (EPA May 2021); Wallops Groundwater Maximum Background Detection (Tetra Tech 2021); Virginia Groundwater Quality Standards (Virginia Administrative Code 9VAC25-280-40).
- Bolded values exceed EPA RSLs, underlined and italicized values exceed Site Background screening levels and shadec cells indicated exceedance of Virginia Groundwater Criteria.

FD = field duplicate
ft btic = feet below top of inner casing
HMW = high molecular weight
J = analyte was positively identified, but value is estimated
LMW = low molecular weight
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
"-" = Not detected
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
WHO = World Health Organization
µg/l = micrograms per liter

**Table 4-6**
**Water Supply Well Groundwater Analytical Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Location | TOC-06 | TOC-06 | TOC-06 | TOC-06 | TOC-06 |
| | | | | | | Sample # | CDL-PWTOC06-00-309450 | CDL-PWTOC06-01-309450 | CDL-PWTOC06-00-309450-02 | CDL-PWTOC06-01-309450-02 | CDL-PWTOC06-04-309450-02 |
| | | | | | | Sample Type | N | FD | N | FD | FD |
| | | | | | | Parent Sample # | | CDL-PWTOC06-00-309450 | | CDL-PWTOC06-00-309450-02 | CDL-PWTOC06-00-309450-02 |
| | | | | | | Start Depth | 154 | 154 | 154 | 154 | 154 |
| | | | | | | End Depth | 225 | 225 | 225 | 225 | 225 |
| | | | | | | Depth Unit | ft tic | ft tic | ft tic | ft tic | ft tic |
| | | | | | | Sample Date | 11/14/2016 | 11/14/2016 | 11/8/2017 | 11/8/2017 | 11/8/2017 |
| Analyte | CAS # | EPA RSL Tapwater | MCLs | Secondary MCLs | Virginia Groundwater Quality Standards | Units | | | | | |
| **Semi-volatile Organic Compounds** | | | | | | | | | | | |
| CAPROLACTAM | 105-60-2 | 990 | -- | -- | -- | ug/l | NA | NA | 1.2 J | -- | 0.92 J |
| **Dioxins/Furans** | | | | | | | | | | | |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.12 | 30 | -- | -- | pg/l | **20** | **19.8** | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0.0 | TEQ_2005_0 | 0.12 | 30 | -- | -- | pg/l | 0 U | 0 U | NA | NA | NA |
| **Inorganics** | | | | | | | | | | | |
| CALCIUM | 7440-70-2 | -- | -- | -- | -- | mg/l | NA | NA | 20 | 20 | 20 |
| IRON | 7439-89-6 | 1.4 | -- | 0.3 | -- | mg/l | NA | NA | *0.41* | *0.39* | *0.41* |
| MAGNESIUM | 7439-95-4 | -- | -- | -- | -- | mg/l | NA | NA | 18 | 18 | 18 |
| MANGANESE | 7439-96-5 | 0.043 | -- | 0.05 | -- | mg/l | NA | NA | 0.0069 J | 0.0068 J | 0.0069 J |
| POTASSIUM | 7440-09-7 | -- | -- | -- | -- | mg/l | NA | NA | 19 | 19 | 19 |
| SODIUM | 7440-23-5 | -- | -- | -- | 270 | mg/l | NA | NA | 43 | 43 | 43 |

- Groundwater samples from monitoring and water supply wells wells analyzed for metals were not filtered in the field (i.e., total metals concentrations are reported).
- Screening levels include the EPA Regional Screeening Levels (RSL) for Tapwater (for non-carcinogens 0.1 times the RSL is listed) (EPA May 2021); EPA Maximum Contaminant Levels (MCLs); Secondary MCLs; Virginia Groundwater Quality Standards (Virginia Administrative Code 9VAC25-280-40).
- Bolded values exceed EPA RSLs, italicized values exceed secondary MCLs

FD = field duplicate
ft tic = feet below top of casing
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
"-" = Not detected
pg/l = picograms per liter
TEQ = toxic equivalency
WHO = World Health Organization
µg/l = micrograms per liter

**Table 4-7**
**Groundwater Water Quality Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| Well ID | Date | Temperature °C | pH pH | ORP mV | Conductivity $mS/cm^3$ | Turbidity NTU | Dissolved Oxygen mg/L |
|---|---|---|---|---|---|---|---|
| DPW-01** | 7/21/2015 | 19.95 | 6.04 | -92 | 0.195 | NA | 0 |
| DPW-02 | 7/22/2015 | 17.48 | 6.83 | -76 | 0.417 | 301 | 2.01 |
| DPW-03 | 7/22/2015 | 19.28 | 6.34 | -131 | 0.333 | 69.1 | 0 |
| DPW-04 | 7/23/2015 | 16.69 | 6.47 | 132 | 0.124 | 52 | 7.06 |
| DPW-05 | 7/24/2015 | 16.86 | 6.44 | -105 | 0.093 | 194 | 0 |
| DPW-06 | 7/23/2015 | 19.4 | 7.04 | 142 | 0.121 | NA | 5.11 |
| DPW-07* | 7/27/2015 | NA | NA | NA | NA | NA | NA |
| DPW-08 | 7/23/2015 | 20.58 | 6.86 | 38 | 0.184 | 46.2 | 0.06 |
| DPW-09 | 7/24/3015 | 18.41 | 6.71 | 34 | 0.203 | 4.1 | 4.4 |
| DPW-10 | 7/21/2015 | 17.75 | 5.84 | 104 | 0.16 | 36 | 4.88 |
| DPW-11 | 7/27/2015 | 21.97 | 6.92 | -164 | 0.579 | >800 | 0 |
| DPW-12 | 5/6/2016 | 12.1 | 6.37 | 96 | 0.192 | 26.5 | 8.36 |
| DPW-13 | 5/4/2016 | 13.04 | 6.52 | -68 | 0.204 | 91.9 | 2.87 |
| DPW-14 | 5/5/2016 | 13.54 | 6.53 | -140 | 0.142 | 50.9 | 1.24 |
| DPW-15 | 5/5/2016 | 12.42 | 6.42 | 91 | 0.197 | 91 | 8.2 |
| DPW-16 | 5/4/2016 | 13.06 | 6.53 | 131 | 0.181 | 14 | 8.79 |
| DPW-17 | 5/10/2016 | 13.39 | 6.14 | -33 | 0.333 | 89 | 1.4 |
| DTW-1 | 8/19/2016 | 19.3 | 6.56 | -174 | 0.204 | 31 | 0.6 |
| DTW-2 | 8/24/2016 | 24.9 | 7.09 | -195 | 0.189 | 84 | 0.88 |
| DTW-3 | 8/26/2016 | 26.5 | 6.39 | 8.4 | 0.169 | 0 | 5.11 |
| DTW-4 | 8/17/2016 | 23.59 | 7.14 | -270 | 0.254 | 9.8 | 1.44 |
| MW-1 | 5/13/2016 | 17.97 | 6.49 | 124 | 0.16 | 10.1 | 7.83 |
| MW-1 | 11/15/2016 | 17.58 | 6.75 | 132 | 0.144 | 10.1 | 5.17 |
| MW-2 | 5/13/2016 | 13.95 | 6.45 | 124 | 0.139 | 36.7 | 7.38 |
| MW-2 | 11/15/2016 | 17.54 | 6.91 | 183 | 0.128 | 0.0 | 6.94 |
| MW-3 | 5/13/2016 | 14.89 | 6.51 | 105 | 0.169 | 0.8 | 6.07 |
| MW-3 | 11/15/2016 | 17.24 | 7.07 | 188 | 0.149 | 0.0 | 7.87 |
| MW-4 | 5/13/2016 | 13.57 | 6.36 | -109 | 0.439 | 3.9 | 1.68 |
| MW-4 | 11/15/2016 | 17.48 | 6.81 | -132 | 0.206 | 6.2 | 0.39 |
| MW-5 | 5/13/2016 | 12.78 | 6.26 | -74 | 0.765 | 9.1 | 1.09 |
| MW-5 | 11/15/2016 | 16.61 | 6.80 | -85 | 0.630 | 9.2 | 0.18 |
| MW-6 | 5/13/2016 | 14.88 | 6.52 | 130 | 0.16 | 8.7 | 11.41 |
| MW-6 | 11/15/2016 | 18.91 | 6.9 | 180 | 0.149 | 0.0 | 8.41 |
| TOC-06 | 11/14/2016 | 15.82 | 8.92 | -101 | 0.437 | 0.0 | 4.21 |
| TOC-06 | 11/8/2017 | 14.10 | 7.94 | -80.00 | 0.43 | 0.00 | 10.20 |

**Notes:**

NA - Water quality data not available.

* - Unable to collect water quality data due to temporary well purging dry.

** - Turbidity sensor did not work properly while purging; sample was clear to the naked eye.

DPT- Shallow Temporary Well; DTW - Deep Temporary Well; MW- Monitoring Well

DO - dissolved oxygen

mg/l = milgrams per liter

$mS/cm^3$ mili-Siemens per cubic centimeter

mv - milivolts

°C - degrees celsius; mV - milivolts; NTU - Nephelometric Turbidity Unit; mg/l - miligrams per liter

> greater than

**Table 4-8**
**Background Pore Water Analytical Data Summary - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Location | PW11 | PW12 | PW20 |
| | | | Sample # | CDL-PW11-00-002 | CDL-PW12-00-002 | CDL-PW20-00-002 |
| | | | Sample Type | N | N | N |
| | | | Parent Sample # | | | |
| | | | Start Depth | 1 | 1 | 1 |
| | | | End Depth | 1 | 1 | 1 |
| | | | Depth Unit | ft bgs | ft bgs | ft bgs |
| | | | Sample Date | 8/25/2016 | 8/22/2016 | 8/25/2016 |
| Analyte | CAS # | EPA Region 3 BTAG Estuarine Water | Units | | | |
| **Dioxins/Furans** | | | | | | |
| OCDD | 3268-87-9 | | pg/l | 56.4 J | -- | -- |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 0.0031 | pg/l | **0.0169** | 0 | 0 |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0031 | pg/l | **20.2** | **19.1** | **20.3** |
| **Metals** | | | | | | |
| ARSENIC | 7440-38-2 | 0.0125 | mg/l | 0.0034 J | **0.17** | **0.018** |
| BARIUM | 7440-39-3 | 0.004 | mg/l | -- | **0.064** | **0.077** |
| BERYLLIUM | 7440-41-7 | 0.00066 | mg/l | -- | 0.00041 J | 0.00029 J |
| CADMIUM | 7440-43-9 | 0.00012 | mg/l | -- | -- | **0.0009 J** |
| CALCIUM | 7440-70-2 | -- | mg/l | 35 | 400 | 300 |
| CHROMIUM | 7440-47-3 | 0.0015 | mg/l | -- | **0.0072 J** | 0.0014 J |
| COBALT | 7440-48-4 | 0.023 | mg/l | -- | 0.0022 J | -- |
| IRON | 7439-89-6 | 0.300 | mg/l | 0.039 J | 0.17 | -- |
| MAGNESIUM | 7439-95-4 | 82 | mg/l | 18 | **1300** | **860** |
| MANGANESE | 7439-96-5 | 0.120 | mg/l | -- | 0.15 | 0.095 |
| POTASSIUM | 7440-09-7 | 53 | mg/l | 20 | 380 | 310 |
| SODIUM | 7440-23-5 | 680 | mg/l | 94 | **10000** | **8100** |
| VANADIUM | 7440-62-2 | 0.020 | mg/l | -- | 0.0038 J | -- |

**Notes:**
Porewater samples analyzed for metals were filtered, i.e, the reported values are dissolved metal concentrations.
mg/l - milgram per liter
pg/l - picograms/liter
ft bgs - feet below the sediment surface
N - Field Sample
J - estimated value below the quantitation limit.
BTAG - EPA Biological Technical Assistance Group
EPA Region 3 BTAG Marine Screening Benchmarks. July 2006.
TEQ - Toxicity Equivalent
WHO - World Health Organization
Bolded values indicate exceedance of BTAG Screening Value.

**Table 4-9**
**Pore Water Analytical Data Summary - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Location | PW13 | PW14 | PW14 | PW15 | PW16 | PW16 | PW17 | PW18 | PW18 | PW19 | PW21 |
| | | | | Sample # | CDL-PW13-00-002 | CDL-PW14-00-002 | CDL-PW14-01-002 | CDL-PW15-00-002 | CDL-PW16-00-002 | CDL-PW16-01-002 | CDL-PW17-00-002 | CDL-PW18-00-002 | CDL-PW18-01-002 | CDL-PW19-00-002 | CDL-PW21-00-002 |
| | | | | Sample Type | N | N | FD | N | N | FD | N | N | FD | N | N |
| | | | | Parent Sample # | | | CDL-PW14-00-002 | | | CDL-PW16-00-002 | | | CDL-PW18-00-002 | | |
| | | | | Start Depth | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | End Depth | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | Depth Unit | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| | | | | Sample Date | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/26/2016 |
| Analyte | CAS # | EPA Region 3 BTAG Estuarine Water | Maximum Mosquito Creek SFI Background | Units | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| CARBON DISULFIDE | 75-15-0 | 0.92 | -- | ug/l | -- | ***1.8*** | ***2*** | -- | -- | -- | ***3.9*** | -- | -- | -- | ***23*** |
| TETRACHLOROETHENE | 127-18-4 | 45 | -- | ug/l | -- | -- | -- | -- | -- | -- | *5.3* | -- | -- | -- | -- |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| BIS(2-ETHYLHEXYL)PHTHALATE | 117-81-7 | 16 | -- | ug/l | -- | -- | -- | -- | -- | -- | -- | 0.75 J | 0.73 J | -- | -- |
| **Dioxin/Furans** | | | | | | | | | | | | | | | |
| OCDD | 3268-87-9 | -- | 56.4 J | pg/l | 35 J | 44.9 J | *57.9 J* | -- | *84.7 J* | *105* | -- | *74.1 J* | -- | *151* | -- |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 0.0031 | 0.0169 | pg/l | **0.0105** | **0.0135** | ***0.0174*** | -- | ***0.0254*** | ***0.0314*** | -- | ***0.0222*** | -- | ***0.0454*** | -- |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0031 | 20.2 | pg/l | **19.3** | **19.2** | **19.1** | ***21*** | **19.8** | **19.1** | **19** | ***21.4*** | ***22.5*** | **19.4** | **20** |
| **Metals** | | | | | | | | | | | | | | | |
| ARSENIC | 7440-38-2 | 0.0125 | 0.17 | mg/l | 0.0097 J | **0.033** | **0.034** | 0.012 J | 0.0078 J | 0.011 J | **0.036** | **0.018** | **0.018** | 0.0063 J | **0.022** |
| BARIUM | 7440-39-3 | 0.004 | 0.077 | mg/l | **0.026** | **0.052** | **0.049** | **0.022 J** | **0.015 J** | **0.015 J** | **0.039** | **0.024 J** | **0.026** | **0.014 J** | **0.025** |
| BERYLLIUM | 7440-41-7 | 0.00066 | 0.00041 J | mg/l | -- | 0.00023 J | -- | -- | -- | -- | 0.00024 J | -- | -- | 0.00022 J | 0.00028 J |
| CADMIUM | 7440-43-9 | 0.00012 | 0.0009 J | mg/l | **0.0006 J** | ***0.0012 J*** | ***0.0011 J*** | **0.0006 J** | -- | ***0.0009 J*** | **0.0006 J** | -- | -- | **0.0007 J** | ***0.0012 J*** |
| CALCIUM | 7440-70-2 | -- | 400 | mg/l | 320 | 360 | 330 | 350 | 320 | 330 | 290 | 330 | 340 | 340 | 360 |
| CHROMIUM | 7440-47-3 | 0.0015 | 0.0072 J | mg/l | 0.0014 J | **0.0024 J** | **0.0017 J** | -- | -- | -- | **0.0016 J** | **0.0034 J** | **0.0031 J** | -- | 0.0012 J |
| IRON | 7439-89-6 | 0.300 | 0.17 | mg/l | *0.18* | -- | -- | 0.051 J | 0.08 J | 0.071 J | -- | 0.043 J | 0.042 J | 0.11 | -- |
| MAGNESIUM | 7439-95-4 | 82 | 1,300 | mg/l | **1000** | **1100** | **1000** | **1100** | **1000** | **1000** | **900** | **1200** | **1200** | **1100** | **1100** |
| MANGANESE | 7439-96-5 | 0.120 | 0.15 | mg/l | **0.14** | 0.075 | 0.069 J | 0.052 J | 0.048 J | 0.05 J | 0.05 J | 0.036 | 0.034 | 0.05 J | **0.13** |
| MERCURY | 7439-97-6 | 0.000016 | -- | mg/l | -- | -- | -- | -- | -- | -- | -- | *3E-05 J* | -- | -- | -- |
| NICKEL | 7440-02-0 | 0.0082 | -- | mg/l | -- | *0.0034 J* | -- | *0.0031 J* | -- | *0.0038 J* | -- | -- | -- | *0.0033 J* | -- |
| POTASSIUM | 7440-09-7 | 53 | 380 | mg/l | **340** | **340** | **330** | ***380*** | **370** | ***380*** | **330** | ***380 J*** | ***500*** | ***390*** | ***400*** |
| SODIUM | 7440-23-5 | 680 | 10,000 | mg/l | **8700** | **8800** | **8800** | **9200** | **8600** | **9000** | **8000** | **7500 J** | ***22000*** | ***10000*** | ***10000*** |
| VANADIUM | 7440-62-2 | 0.020 | 0.0038 J | mg/l | -- | *0.0042 J* | 0.0036 J | -- | 0.0029 J | 0.0027 J | 0.0034 J | -- | -- | 0.003 J | 0.0034 J |
| ZINC | 7440-66-6 | 0.081 | -- | mg/l | -- | -- | -- | -- | -- | -- | -- | *0.0034 J* | *0.013 J* | -- | -- |

**Notes:**
Porewater samples analyzed for metals were filtered, i.e, the reported values are dissolved metal concentrations.
Bolded value indicates exceedance of BTAG Screening Value; underlined and italicized value indicates exceedance of SFI maximum background value.
mg/l - milgram per liter
pg/l - picograms/liter
ug/l = micrograms per liter
"-" = not detected
ft bgs - feet below the sediment surface
FD = field duplicate
N - Field Sample
J - estimated value below the quantitation limit.
BTAG - EPA Biological Technical Assistance Group
EPA Region 3 BTAG Marine Sediment Screening Benchmarks. July 2006.
TEQ - Toxicity Equivalent
WHO - World Health Organization

# Table 4-10
# Background Sediment Analytical Data Summary - Project 15 CDL
# Supplemental Field Investigation
# Wallops Island, Virginia

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Location | SD11 | SD12 | SD20 |
| | | | Sample # | CDL-SD11-00-001 | CDL-SD12-00-001 | CDL-SD20-00-001 |
| | | | Sample Type | N | N | N |
| | | | Parent Sample # | | | |
| | | | Start Depth | 0 | 0 | 0 |
| | | | End Depth | 0.5 | 0.5 | 0.5 |
| | | | Depth Unit | ft bgs | ft bgs | ft bgs |
| | | | Sample Date | 8/22/2016 | 8/22/2016 | 8/22/2016 |
| Analyte | CAS # | EPA Region 3 BTAG Esturarine Sediment | Units | | | |
| **Volatile Organic Compoounds** | | | | | | |
| 2-Butanone (MEK) | 78-93-3 | -- | ug/kg | 57 J | -- | 25 J |
| ACETONE | 67-64-1 | -- | ug/kg | 310 | -- | 130 |
| CARBON DISULFIDE | 75-15-0 | -- | ug/kg | 82 | -- | 77 |
| **Dioxin/Furans** | | | | | | |
| 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN | 35822-46-9 | -- | pg/g | 15.9 | 6.73 J | 9.31 |
| 2,3,7,8-TETRACHLORODIBENZOFURAN | 51207-31-9 | -- | pg/g | 0.996 J | -- | -- |
| OCDD | 3268-87-9 | -- | pg/g | 313 | 122 | 218 J |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 0.85[1] | pg/g | 0.353 | 0.104 | 0.158 |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.85[1] | pg/g | **4.66** | **3.13** | **1.99** |
| **Metals** | | | | | | |
| ALUMINUM | 7429-90-5 | -- | mg/kg | 16000 | 26000 | 13000 |
| ARSENIC | 7440-38-2 | 7.24 | mg/kg | 7 | **13 J** | 5.8 |
| BARIUM | 7440-39-3 | -- | mg/kg | 32 | 54 J | 26 |
| CADMIUM | 7440-43-9 | 0.68 | mg/kg | 0.12 J | -- | 0.26 J |
| CALCIUM | 7440-70-2 | -- | mg/kg | 3100 | 3200 J | 2700 |
| CHROMIUM | 7440-47-3 | 52.3 | mg/kg | 32 | **54 J** | 26 |
| COBALT | 7440-48-4 | 50 | mg/kg | 4.6 | 7.3 J | 4.2 |
| COPPER | 7440-50-8 | 18.7 | mg/kg | 12 | **19 J** | 11 |
| IRON | 7439-89-6 | 20,000 | mg/kg | 17000 | **29000** | 17000 |
| LEAD | 7439-92-1 | 30.2 | mg/kg | 16 | 21 J | 13 |
| MAGNESIUM | 7439-95-4 | -- | mg/kg | 8800 | 11000 J | 5000 |
| MANGANESE | 7439-96-5 | 460 | mg/kg | 120 | 230 J | 130 |
| NICKEL | 7440-02-0 | 15.9 | mg/kg | 15 | **24 J** | 12 |
| POTASSIUM | 7440-09-7 | -- | mg/kg | 4600 | 6200 | 2900 |
| SODIUM | 7440-23-5 | -- | mg/kg | 39000 | 24000 | 10000 |
| VANADIUM | 7440-62-2 | -- | mg/kg | 46 | 67 J | 31 |
| ZINC | 7440-66-6 | 124 | mg/kg | 54 | 85 J | 53 |

**Notes:**

Bolded values indicate exceedance of BTAG Screening Value.

[1] - NOAA SQuiRTS Table.

mg/kg - milgram per kilogram

pg/g - picograms/gram

ug/kg - micrograms/kilogram

"-" = not detected

ft bgs - feet below the sediment surface

N - Field Sample

J - estimated value below the quantitation limit.

BTAG - EPA Biological Technical Assistance Group

EPA Region 3 BTAG Marine Sediment Screening Benchmarks. July 2006.

TEQ - Toxicity Equivalent

WHO - World Health Organization

**Table 4-11**
**Sediment Analytical Data Summary - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Location | SD13 | SD14 | SD15 | SD16 | SD16 | SD17 | SD17 | SD18 | SD18 | SD19 | SD21 |
| | | | | Sample # | CDL-SD13-00-001 | CDL-SD14-00-001 | CDL-SD15-00-001 | CDL-SD16-00-001 | CDL-SD16-01-001 | CDL-SD17-00-001 | CDL-SD17-01-001 | CDL-SD18-00-001 | CDL-SD18-01-001 | CDL-SD19-00-001 | CDL-SD21-00-001 |
| | | | | Sample Type | N | N | N | N | FD | N | FD | N | FD | N | N |
| | | | | Parent Sample # | | | | | CDL-SD16-00-001 | | CDL-SD17-00-001 | | CDL-SD18-00-001 | | |
| | | | | Start Depth | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | End Depth | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | | | | Depth Unit | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| | | | | Sample Date | 8/23/2016 | 8/23/2016 | 8/23/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/26/2016 |
| Analyte | CAS # | EPA Region 3 BTAG Estuarine Sediment | Maximum Mosquito Creek SFI Background | Units | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 2-Butanone (MEK) | 78-93-3 | -- | 57 J | ug/kg | *69 J* | -- | 40 J | -- | 35 J | -- | 25 J | 31 J | 35 J | -- | 28 J |
| ACETONE | 67-64-1 | -- | 310 | ug/kg | *330 J* | 270 | 170 | 120 J | 160 J | 110 J | 120 | 120 | 160 | -- | 130 |
| CARBON DISULFIDE | 75-15-0 | -- | 82 | ug/kg | 34 J | 55 | 12 J | 72 | 54 | 37 | 26 J | *180* | 58 | -- | 74 |
| CARBON TETRACHLORIDE | 56-23-5 | 7,240 | -- | ug/kg | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | *30 J* |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| FLUORANTHENE | 206-44-0 | 113 | -- | ug/kg | -- | -- | -- | *17 J* | -- | -- | -- | -- | -- | -- | -- |
| PAH, HMW Total | HPAH | 655 | -- | ug/kg | -- | -- | -- | *17* | -- | -- | -- | -- | -- | -- | -- |
| **Dioxins/Furans** | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN | 35822-46-9 | -- | 15.9 | pg/g | *16.8* | 13.9 | *41.6* | *46.3* | *117* | -- | 2.75 J | *5.54 J* | *16* | *41.5* | *58.7* |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | -- | -- | pg/g | -- | -- | -- | -- | *3.54 J* | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN | 39227-28-6 | -- | -- | pg/g | -- | -- | -- | -- | *3.13 J* | -- | -- | -- | -- | -- | -- |
| 1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN | 57653-85-7 | -- | -- | pg/g | -- | -- | -- | -- | *5.38 J* | -- | -- | -- | -- | -- | -- |
| 1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN | 19408-74-3 | -- | -- | pg/g | -- | -- | *2.6 J* | *3.36 J* | *8.17* | -- | -- | -- | -- | 3.18 J | 4.37 J |
| 2,3,7,8-TETRACHLORODIBENZOFURAN | 51207-31-9 | -- | 0.996 J | pg/g | -- | -- | 0.655 J | 0.783 J | *1.47 J* | -- | -- | -- | 0.479 J | 0.66 J | *1.33 J* |
| OCDD | 3268-87-9 | -- | 313 | pg/g | 271 | 258 | *777* | *804* | *2020* | 32.7 | 48.6 | 93.5 | 269 | *730* | *1030* |
| Total TEQ (WHO 2005) ND = 0 | TEQ_2005_0 | 0.85[1] | 0.353 | pg/g | 0.25 | 0.217 | ***0.975*** | ***1.12*** | ***3.62*** | 0.0098 | 0.042 | 0.0835 | 0.289 | ***1.02*** | ***1.47*** |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.85[1] | 4.66 | pg/g | **3.51** | **3** | **3.16** | **3.38** | ***6.02*** | **3.01** | **3.01** | **2.51** | **2.79** | **3.59** | **4.53** |
| **Metals** | | | | | | | | | | | | | | | |
| ALUMINUM | 7429-90-5 | -- | 26,000 | mg/kg | 18000 | 19000 | 15000 | 21000 | 22000 | 18000 | 21000 | 18000 | 20000 | *28000* | 16000 |
| ARSENIC | 7440-38-2 | 7.24 | 13 J | mg/kg | **7.8** | **8.1** | 6.1 | **8.5** | **8.5** | **7.4** | **9** | **7.6 J** | **8.1 J** | ***20 J*** | **11** |
| BARIUM | 7440-39-3 | -- | 54 J | mg/kg | 39 | 40 | 33 | 47 | 48 | 39 | 44 | 40 J | 44 J | *62 J* | 33 |
| BERYLLIUM | 7440-41-7 | -- | -- | mg/kg | -- | -- | -- | *0.57 J* | *0.61 J* | *0.48 J* | *0.54 J* | *0.25 J* | *0.28 J* | *0.85 J* | *0.41 J* |
| CADMIUM | 7440-43-9 | 0.68 | 0.26 J | mg/kg | 0.098 J | 0.19 J | 0.093 J | *0.3 J* | *0.28 J* | 0.25 J | *0.3 J* | 0.16 J | 0.17 J | -- | 0.15 J |
| CALCIUM | 7440-70-2 | -- | 3,200 J | mg/kg | 3000 | *3900* | 2000 | 2800 | 3000 | 2600 | 3000 | 2700 | *3400* | *4100 J* | 2500 |
| CHROMIUM | 7440-47-3 | 52.3 | 54 J | mg/kg | 37 | 40 | 31 | 45 | 49 | 38 | 46 | 37 J | 41 J | ***59 J*** | 37 |
| COBALT | 7440-48-4 | 50 | 7.3 J | mg/kg | 4.6 | 5.6 | 4.4 | 6.3 | 7 | 5.3 | 6.5 | 5.4 J | 6 J | *7.7 J* | 5.9 |
| COPPER | 7440-50-8 | 18.7 | 19 J | mg/kg | 14 | 15 | 11 | 18 | 18 | 14 | 17 | 14 J | 15 J | 18 | 15 |
| IRON | 7439-89-6 | 20,000 | 29,000 | mg/kg | 17000 | **22000** | 16000 | **25000** | **27000** | **21000** | **26000** | **22000** | **25000** | ***34000*** | **23000** |
| LEAD | 7439-92-1 | 30.2 | 21 J | mg/kg | 17 | 17 | 13 | 19 | 20 | 15 | 19 | 14 J | 16 J | *23 J* | 18 |
| MAGNESIUM | 7439-95-4 | -- | 11,000 J | mg/kg | 8400 | 8400 | 6000 | 8600 | 9100 | 7600 | 8800 | 8100 J | 9300 J | *13000 J* | 7300 |
| MANGANESE | 7439-96-5 | 460 | 230 J | mg/kg | 130 | 170 | 120 | 200 | 220 | 170 | 200 | 170 | 190 | *290 J* | 140 |
| MERCURY | 7439-97-6 | 0.13 | -- | mg/kg | -- | -- | -- | *0.1 J* | *0.12 J* | *0.11 J* | *0.11 J* | *0.11 J* | *0.1 J* | -- | -- |
| NICKEL | 7440-02-0 | 15.9 | 24 J | mg/kg | 15 | **18** | 14 | **20** | **22** | **17** | **21** | **17 J** | **19 J** | ***26 J*** | **17** |
| POTASSIUM | 7440-09-7 | -- | 6,200 | mg/kg | 5000 | 4900 | 3700 | 5200 | 5400 | 4500 | 5100 | 4600 J | 5100 J | *7100 J* | 4100 |
| SODIUM | 7440-23-5 | -- | 39,000 | mg/kg | 31000 | 26000 | 13000 | 20000 | 21000 | 21000 | 23000 | 21000 J | 24000 J | 37000 | 25000 |
| VANADIUM | 7440-62-2 | -- | 67 J | mg/kg | 50 | 51 | 38 | 50 | 54 | 42 | 50 | 42 J | 46 J | *77 J* | 49 |
| ZINC | 7440-66-6 | 124 | 85 J | mg/kg | 53 | 66 | 50 | *110* | *86* | 67 | 83 | 63 J | 71 J | *89 J* | 68 |

**Notes:**
Bolded value indicates exceedance of BTAG Screening Value; underlined and italicized value indicates exceedance of SFI maximum background value.

[1] - NOAA SQuiRTS Table.

mg/kg - milgram per kilogram

pg/g - picograms/gram

ug/kg - micrograms/kilogram

"-" = not detected

ft bgs - feet below the sediment surface

N - Field Sample

J - estimated value below the quantitation limit.

BTAG - EPA Biological Technical Assistance Group

EPA Region 3 BTAG Marine Sediment Screening Benchmarks. July 2006.

TEQ - Toxicity Equivalent

WHO - World Health Organization

**Table 4-12**
**Pore Water Quality Data - Project 15 CDL**
**Supplemental Field Investigation**
**Wallops Island, Virginia**

| Well ID | Date | Temperature °C | pH pH | ORP mV | Conductivity $mS/cm^3$ | Turbidity NTU | Dissolved Oxygen mg/L |
|---|---|---|---|---|---|---|---|
| PW-11 | 8/25/1961 | 25.99 | 7.43 | -299 | 0.791 | 41.2 | 1.7 |
| PW-12 | 8/22/2016 | 26.76 | 6.63 | -415 | 60.6 | 0 | 0.28 |
| PW-13 | 8/24/2016 | 25.7 | 6.45 | -384 | 49.1 | 0 | 0 |
| PW-14 | 8/24/2016 | 26.61 | 6.56 | -383 | 50.1 | 27.1 | 0.12 |
| PW-15 | 8/24/2016 | 28.69 | 6.57 | -371 | 51.2 | 31.3 | 0.22 |
| PW-16 | 8/30/2016 | NA | NA | NA | NA | NA | NA |
| PW-17 | 8/30/2016 | NA | NA | NA | NA | NA | NA |
| PW-18 | 8/30/2016 | NA | NA | NA | NA | NA | NA |
| PW-19 | 8/26/2016 | NA | NA | NA | NA | NA | NA |
| PW-20 | 8/25/2016 | 26.45 | 6.80 | -327 | 39.8 | 9.0 | 2.90 |
| PW-21 | 8/26/2016 | 26.32 | 6.56 | -332 | 53.4 | 0 | 3.64 |

NA - Water quality data not available. Instrument not working.

mv - milivolts

°C - degrees celsius; mV - milivolts; NTU - Nephelometric Turbidity Unit; mg/l - miligrams per liter

**Table 5-1**

**Comparison of 2007 and 2016 VOC Concentrations in Monitoring Well MW-4, Project 15 CDL**

| Location | | MW-4 | MW-4 | MW-4 | MW-04 | MW-4 | MW-4 | MW-4 |
|---|---|---|---|---|---|---|---|---|
| Sample # | | | DUPLICATE | | CDL-MW4-00-009028 | CDL-MW4-01-009028 | CDL-MW4-00-009028-02 | CDL-MW4-01-009028-02 |
| Sample Type | | | | | N | FD | N | FD |
| Parent Sample # | | | | | | CDL-MW4-00-009028 | | CDL-MW4-00-009028-02 |
| Sample Date | | 5/2/2007 | 5/2/2007 | 12/19/2007 | 5/13/2016 | 5/13/2016 | 11/15/2016 | 11/15/2016 |
| Analyte | Units | | | | | | | |
| 1,2-DICHLOROETHANE | ug/l | | | 2.9 | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone (MIBK) | ug/l | | | ND | 3.6 J | -- | -- | -- |
| CHLOROETHANE | ug/l | | | | -- | 4.4 J | -- | -- |
| CIS-1,2-DICHLOROETHENE | ug/l | 45.4 | 50.8 | 54.5 | 22 | 21 | 22 J | -- |
| CYCLOHEXANE | ug/l | 158 | 128 | 216 | 180 | 190 | 330 | 330 |
| ETHYLBENZENE | ug/l | 450 | 389 | 548 | 430 | 450 | 580 | 600 |
| ISOPROPYLBENZENE | ug/l | 48.5 | 49.9 | 68.6 | 56 J | 60 J | 80 | 83 |
| METHYLCYLOHEXANE | ug/l | 110 | 105 | 180 | 99 | 110 | 200 J | 210 J |
| TETRACHLOROETHENE | ug/l | 13.7 | 13.9 | 7.9 | 3.8 J | 3.6 J | -- | -- |
| TRICHLOROETHENE | ug/l | 3.1 | 3.6 | ND | ND | ND | ND | ND |
| TOLUENE | ug/l | 1460 | 1220 | 1680 | 670 J | 650 J | 540 | 570 |
| XYLENES (TOTAL) | ug/l | 2310 | 1900 | 3040 | 2500 | 2600 | 3400 | 3500 |

FD= field Duplicate.

ND = not detected

N= Normal Sample

ug/l = micrograms per liter

**Table 6-1**
**Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Central/Southern (C/S) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, C/S** | | | | |
| Soil | 7E-05 | 0.5 | 4E-05 | **3** |
| Groundwater | 6E-09 | 0.0001 | 6E-09 | 0.0001 |
| **Cumulative Total** | 7E-05 | 0.5 | 4E-05 | **3** |
| **Teen Trespasser, C/S - Soil Only** | 8E-06 | 0.3 | 5E-06 | 0.6 |
| **Child Outdoor Recreator, C/S - Soil Only** | NA | **4** | NA | **7** |
| **Adult Outdoor Recreator, C/S - Soil Only** | NA | 0.3 | NA | 1 |
| **Lifetime Outdoor Recreator, C/S - Soil Only** | **6E-04** | NA | **3E-04** | NA |
| **Indoor/Outdoor Commercial Worker, C/S** | | | | |
| Soil | NA | NA | 4E-05 | **4** |
| Groundwater | NA | NA | **4E-04** | **7** |
| **Cumulative Total** | NA | NA | **4E-04** | **11** |
| **Construction Worker, C/S** | | | | |
| Soil | NA | NA | 6E-06 | **5** |
| Groundwater | NA | NA | 4E-05 | **11** |
| **Cumulative Total** | NA | NA | 4E-05 | **16** |
| **Child Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **22** |
| Groundwater | NA | NA | **--** | **53** |
| **Cumulative Total** | NA | NA | -- | **75** |
| **Adult Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **13** |
| Groundwater | NA | NA | **--** | **45** |
| **Cumulative Total** | NA | NA | -- | **57** |
| **Lifetime Resident, C/S** | | | | |
| Soil | NA | NA | **6E-04** | -- |
| Groundwater | NA | NA | **3E-03** | -- |
| **Cumulative Total** | NA | NA | **3E-03** | -- |
| **Northern/Western (N/W) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, N/W** | | | | |
| Soil | 5E-06 | 0.05 | 5E-06 | 0.05 |
| Groundwater | 6E-09 | 0.0001 | 6E-09 | 0.0001 |
| **Cumulative Total** | 5E-06 | 0.05 | 5E-06 | 0.05 |
| **Teen Trespasser, N/W - Soil Only** | 6E-07 | 0.02 | 6E-07 | 0.02 |
| **Child Outdoor Recreator, N/W - Soil Only** | -- | 0.4 | NA | 0.4 |
| **Adult Outdoor Recreator, N/W - Soil Only** | -- | 0.04 | NA | 0.04 |

## Table 6-1
## Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Lifetime Outdoor Recreator, N/W - Soil Only** | 4E-05 | -- | 4E-05 | NA |
| **Indoor/Outdoor Commercial Worker, N/W** | | | | |
| Soil | NA | NA | 5E-06 | 0.06 |
| Groundwater | NA | NA | **4E-04** | **7** |
| **Cumulative Total** | NA | NA | **4E-04** | **7** |
| **Construction Worker, N/W** | | | | |
| Soil | NA | NA | 6E-07 | 0.2 |
| Groundwater | NA | NA | 4E-05 | **11** |
| **Cumulative Total** | NA | NA | 4E-05 | **11** |
| **Child Resident, N/W** | | | | |
| Soil | NA | NA | **--** | **0.8** |
| Groundwater | NA | NA | **--** | **53** |
| **Cumulative Total** | NA | NA | -- | **54** |
| **Adult Resident, N/W** | | | | |
| Soil | NA | NA | **--** | **0.08** |
| Groundwater | NA | NA | **--** | **45** |
| **Cumulative Total** | NA | NA | -- | **45** |
| **Lifetime Resident, N/W** | | | | |
| Soil | NA | NA | **7E-05** | -- |
| Groundwater | NA | NA | **3E-03** | -- |
| **Cumulative Total** | NA | NA | **3E-03** | -- |
| **Upgradient Drainage Exposure Area - Surface Water and Sediment** | | | | |
| Outdoor Worker, U/D | 1E-05 | 0.04 | NA | NA |
| Teen Trespasser, U/D | 2E-06 | 0.003 | NA | NA |
| Child Outdoor Recreator, U/D | -- | 0.2 | NA | NA |
| Adult Outdoor Recreator, U/D | -- | 0.02 | NA | NA |
| Lifetime Outdoor Recreator, U/D | 5E-05 | -- | NA | NA |
| **Downgradient/Estuarine Exposure Area - Surface Water and Sediment** | | | | |
| Teen Trespasser, D/E | 4E-06 | 0.01 | NA | NA |
| Child Outdoor Recreator, D/E | -- | 0.4 | NA | NA |
| Adult Outdoor Recreator, D/E | -- | 0.06 | NA | NA |
| Lifetime Outdoor Recreator, D/E | 7E-05 | -- | NA | NA |

**Notes:**

-- = COPCs do not exhibit toxicological health effects to calculate either cancer risks or hazards for this pathway.

COPC = chemical of potential concern; C/S = Central/Southern; D/E = Downgradient/Estuarine;

NA = Not Applicable; N/W = Northern/Western; UD = Upgradient Drainage

## Table 6-1
## Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |

*Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

** Risk-based screen results did not identify any detected groundwater COPCs in the deeper Yorktown Aquifer; offsite residential exposure to groundwater was not evaluated.

**EPA Target Thresholds (Exceedances are Shaded):**

- Target Cumulative Cancer Risk Threshold of 1×10-4 (1E-04).
- Target Non-Cancer Hazard Threshold, or Hazard Index (HI), of 1.

**Table 6-2**
**Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Central/Southern (C/S) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, C/S** | | | | |
| Soil | 6E-06 | 0.2 | 4E-06 | **3** |
| Groundwater | 1E-09 | 0.0001 | 1E-09 | 0.0001 |
| **Cumulative Total** | 6E-06 | 0.2 | 4E-06 | **3** |
| **Teen Trespasser, C/S - Soil Only** | 2E-06 | 0.3 | 2E-06 | 0.5 |
| **Child Outdoor Recreator, C/S - Soil Only** | NA | 0.5 | NA | 0.9 |
| **Adult Outdoor Recreator, C/S - Soil Only** | NA | 0.04 | NA | 0.3 |
| **Lifetime Outdoor Recreator, C/S - Soil Only** | **1E-04** | NA | 7E-05 | NA |
| **Indoor/Outdoor Commercial Worker, C/S** | | | | |
| Soil | NA | NA | 4E-06 | **2** |
| Groundwater | NA | NA | 5E-05 | **4** |
| **Cumulative Total** | NA | NA | 6E-05 | **5** |
| **Construction Worker, C/S** | | | | |
| Soil | NA | NA | 6E-07 | **2** |
| Groundwater | NA | NA | 9E-06 | **6** |
| **Cumulative Total** | NA | NA | 1E-05 | **7** |
| **Child Resident, C/S** | | | | |
| Soil | NA | NA | -- | **4** |
| Groundwater | NA | NA | -- | **38** |
| **Cumulative Total** | NA | NA | -- | **42** |
| **Adult Resident, C/S** | | | | |
| Soil | NA | NA | -- | **1** |
| Groundwater | NA | NA | -- | **42** |
| **Cumulative Total** | NA | NA | -- | **43** |
| **Lifetime Resident, C/S** | | | | |
| Soil | NA | NA | **2E-04** | -- |
| Groundwater | NA | NA | **2E-03** | -- |
| **Cumulative Total** | NA | NA | **2E-03** | -- |
| **Northern/Western (N/W) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, N/W** | | | | |
| Soil | 5E-07 | 0.02 | 5E-07 | 0.02 |
| Groundwater | 1E-09 | 0.0001 | 1E-09 | 0.0001 |
| **Cumulative Total** | 5E-07 | 0.02 | 5E-07 | 0.02 |
| **Teen Trespasser, N/W - Soil Only** | 3E-07 | 0.02 | 2E-07 | 0.02 |
| **Child Outdoor Recreator, N/W - Soil Only** | NA | 0.05 | NA | 0.05 |
| **Adult Outdoor Recreator, N/W - Soil Only** | NA | 0.004 | NA | 0.004 |

## Table 6-2
## Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Lifetime Outdoor Recreator, N/W - Soil Only** | 7E-06 | NA | 7E-06 | NA |
| **Indoor/Outdoor Commercial Worker, N/W** | | | | |
| Soil | NA | NA | 4E-07 | 0.03 |
| Groundwater | NA | NA | 5E-05 | **4** |
| **Cumulative Total** | NA | NA | 5E-05 | **4** |
| **Construction Worker, N/W** | | | | |
| Soil | NA | NA | 6E-08 | 0.04 |
| Groundwater | NA | NA | 9E-06 | **6** |
| **Cumulative Total** | NA | NA | 9E-06 | **6** |
| **Child Resident, N/W** | | | | |
| Soil | NA | NA | -- | 0.2 |
| Groundwater | NA | NA | -- | **38** |
| **Cumulative Total** | NA | NA | -- | **38** |
| **Adult Resident, N/W** | | | | |
| Soil | NA | NA | -- | 0.02 |
| Groundwater | NA | NA | -- | **42** |
| **Cumulative Total** | NA | NA | -- | **42** |
| **Lifetime Resident, N/W** | | | | |
| Soil | NA | NA | 2E-05 | -- |
| Groundwater | NA | NA | **2E-03** | -- |
| **Cumulative Total** | NA | NA | **2E-03** | -- |
| **Upgradient Drainage Exposure Area** | | | | |
| Outdoor Worker, U/D | 1E-06 | 0.02 | NA | NA |
| Teen Trespasser, U/D | 6E-07 | 0.002 | NA | NA |
| Child Outdoor Recreator, U/D | -- | 0.02 | NA | NA |
| Adult Outdoor Recreator, U/D | -- | 0.002 | NA | NA |
| Lifetime Outdoor Recreator, U/D | 8E-06 | -- | NA | NA |
| **Downgradient/Estuarine Exposure Area** | | | | |
| Teen Trespasser, D/E | 1E-06 | 0.005 | NA | NA |
| Child Outdoor Recreator, D/E | -- | 0.06 | NA | NA |
| Adult Outdoor Recreator, D/E | -- | 0.008 | NA | NA |
| Lifetime Outdoor Recreator, D/E | 1E-05 | -- | NA | NA |

**Notes:**

-- = COPCs do not exhibit toxicological health effects to calculate either cancer risks or hazards for this pathway.

COPC = chemical of potential concern; C/S = Central/Southern; D/E = Downgradient/Estuarine;

NA = Not Applicable; N/W = Northern/Western; UD = Upgradient Drainage

## Table 6-2
## Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |

*Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

** Risk-based screen results did not identify any detected groundwater COPCs in the deeper Yorktown Aquifer; offsite residential exposure to groundwater was not evaluated.

**EPA Target Thresholds (Exceedances are Shaded):**

- Target Cumulative Cancer Risk Threshold of 1×10-4 (1E-04).
- Target Non-Cancer Hazard Threshold, or Hazard Index (HI), of 1.

**Table 6-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| **Central/Southern Exposure Area** | | | | | | | | | |
| RME | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 6E-04 | Benzo(a)pyrene | SVOC | RME only | 3E-06 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | 2E-06 | NA | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | 3E-06 | NA | |
| | | | | Arsenic | MET | RME only | 4E-06 | NA | |
| | | | | Chromium, total | MET | RME+CTE | 6E-04 | NA | |
| | | | Future: 3E-04 | 1,1,2-Trichloroethane | VOC | RME only | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | RME only | NA | 3E-06 | |
| | | | | Benzo(a)pyrene | SVOC | RME only | NA | 1E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME only | NA | 3E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME only | NA | 2E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 3E-06 | |
| | | | | Arsenic | MET | RME only | NA | 8E-06 | |
| | | | | Chromium, total | MET | RME only | NA | 2E-04 | |
| RME | Future | Indoor/Outdoor Commercial Worker, C/S | Future: 4E-04 | Benzo(a)pyrene | SVOC | RME only | NA | 1E-05 | Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | RME only | NA | 3E-06 | |
| | | | | Chromium, Total | MET | RME only | NA | 2E-05 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 3E-06 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | RME only | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME only | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | RME only | NA | 9E-05 | |
| | | | | Naphthalene | VOC | RME only | NA | 6E-06 | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 8E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 3E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 2E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-03 | |

**Table 6-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [(b)] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | Ethylbenzene | VOC | RME+CTE | NA | 4E-04 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | RME only | NA | 3E-06 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 2E-06 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 2E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME+CTE | NA | 6E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | NA | 3E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME+CTE | NA | 4E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 5E-06 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-05 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| CTE | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 1E-04 | Chromium, Total | MET | RME+CTE | 1E-04 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| CTE | Future | Onsite Lifetime Resident, C/S | Future: 2E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7E-05 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 2E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 3E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 4E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 7E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 2E-06 | |
| | | | | Benzo(a)anthracene | SVOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-05 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME+CTE | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME+CTE | NA | 1E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 1E-06 | |
| | | | | Arsenic | MET | RME+CTE | NA | 3E-06 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 9E-05 | |
| **Northern/Western Exposure Area** | | | | | | | | | |
| RME | Future | Indoor/Outdoor Commercial Worker, N/W | Future: 4E-04 | 1,2-Dichloroethane | VOC | RME only | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (Vapor Intrusion [VI]) |
| | | | | Benzene | VOC | RME only | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | RME only | NA | 9E-05 | |
| | | | | Naphthalene | VOC | RME only | NA | 6E-06 | |
| | | | | Chromium, Total | MET | RME only | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |

**Table 6-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [(b)] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| RME | Future | Onsite Lifetime Resident, N/W | Future: 3E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 8E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 3E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 2E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-03 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 3E-06 | |
| | | | | Arsenic | MET | RME only | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Chromium, Total | MET | RME+CTE | NA | 7E-05 | |
| CTE | Future | Onsite Lifetime Resident, N/W | Future: 2E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 5E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7E-05 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 2E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 3E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 4E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 7E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 2E-06 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 2E-05 | Ingestion and Dermal Contact with Total Soil |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

= COC below BTVs

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| **Central/Southern Exposure Area** | | | | | | | | | |
| **RME** | Outdoor Worker, C/S | Future: 3 | Respiratory System (RS) = 3 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Child Outdoor Recreator, C/S | Current/Future: 4 | Gastrointestinal (GI) = 1 | Copper | MET | RME only | 0.5 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Iron | MET | RME only | 0.5 | NA | |
| | | | Other (OT) = 1 | Antimony | MET | RME only | 0.7 | NA | |
| | | | | Nickel | MET | RME only | 0.3 | NA | |
| | | Future: 7 | Gastrointestinal (GI) = 1 | Copper | MET | RME only | NA | 0.5 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME only | NA | 0.6 | |
| | | | Hematological (HM) = 2 | Antimony | MET | RME only | NA | 2 | |
| | | | Other (OT) = 2 | Antimony | MET | RME only | NA | 2 | |
| | | | | Nickel | MET | RME only | NA | 0.3 | |
| **RME** | Indoor/Outdoor Commercial Worker, C/S | Future: 11 | Immune System (IM) = 4 | Benzene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME only | NA | 0.2 | |
| | | | Nervous System (NV) = 4 | Naphthalene | VOC | RME only | NA | 0.2 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 3 | |
| | | | Respiratory System (RS) = 3 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 3 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Construction Worker, C/S | Future: 16 | Hematological (HM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 8 | Manganese | MET | RME only | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Manganese | MET | RME+CTE | NA | 0.2 | Inhalation of Particles in Outdoor Air from Total Soil (Trench) |
| | | | | 2-Hexanone | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Total Soil (Trench) |
| | | | | Isopropylbenzene | VOC | RME+CTE | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Mercury | MET | RME only | NA | 0.1 | |
| | | | Other (OT) = 2 | Xylenes, Total | VOC | RME only | NA | 1 | |
| | | | Respiratory System (RS) = 9 | Isopropylbenzene | VOC | RME only | NA | 0.2 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Onsite Child Resident, C/S | Future: 75 | Cardiovascular System (CV) = 2 | Arsenic | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Dermal (DM) = 9 | Arsenic | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Thallium | MET | RME+CTE | NA | 0.1 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 7 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Child Resident, C/S | Future: 75 | Developmental System (DV) = 3 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Endocrine (EN) = 2 | Isopropylbenzene | VOC | RME only | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Cobalt | MET | RME only | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Cobalt | MET | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Gastrointestinal (GI) = 3 | Beryllium | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Copper | MET | RME+CTE | NA | 0.9 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME+CTE | NA | 1 | |
| | | | | Iron | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Immune System (IM) = 20 | Benzene | VOC | RME+CTE | NA | 4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.1 | |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 18 | 2-Hexanone | VOC | RME only | NA | 0.2 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Aluminum | MET | RME+CTE | NA | 0.2 | |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 2-Hexanone | VOC | RME only | NA | 0.1 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Aluminum | MET | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 2 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Reproductive System (RP) = 2 | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 0.5 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Respiratory System (RS) = 12 | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 11 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | Urinary System = 2 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.3 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.9 | |
| | | | | Cadmium (Diet) | MET | RME only | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Adult Resident, C/S | Future: 57 | Dermal (DM) = 5 | Arsenic | MET | RME+CTE | NA | 0.8 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 4 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Gastrointestinal (GI) = 1 | Iron | MET | RME+CTE | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Beryllium | MET | RME only | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Iron | MET | RME+CTE | NA | 0.6 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 16 | Aluminum | MET | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.01 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 12 | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 11 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Urinary System = 1 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Outdoor Worker, C/S | Future: 3 | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| CTE | Indoor/Outdoor Commercial Worker, C/S | Future: 5 | Respiratory System (RS) = 1 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | Immune System (IM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Nervous System (NV) = 2 | Xylenes, Total | VOC | RME+CTE | NA | 3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Construction Worker, C/S | Future: 7 | Hematological (HM) = 1 | Benzene | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 4 | Manganese | MET | RME+CTE | NA | 0.1 | Inhalation of Particles in Outdoor Air from Total Soil (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Respiratory System (RS) = 5 | Naphthalene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Onsite Adult Resident, C/S | Future: 43 | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.8 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 0.003 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Dermal (DM) = 4 | Arsenic | MET | RME+CTE | NA | 0.6 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 3 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.8 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| CTE | Onsite Child Resident, C/S | Future: 42 | Dermal (DM) = 2 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Benzo(a)pyrene | SVOC | RME+CTE | NA | 0.4 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Gastrointestinal (GI) = 1 | Copper | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME+CTE | NA | 0.3 | |
| | | | | Beryllium | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Iron | MET | RME+CTE | NA | 0.3 | |
| | | | Immune System (IM) = 17 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Manganese | MET | RME+CTE | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Onsite Child Resident, C/S | Future: 42 | Nervous System (NV) = 15 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Other (OT) = 1 | Antimony | MET | RME+CTE | NA | 0.9 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Nickel | MET | RME+CTE | NA | 0.1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.2 | |
| **Northern/Western Exposure Area** | | | | | | | | | |
| RME | Indoor/Outdoor Commercial Worker, N/W | Future: 8 | Immune System (IM) = 4 | Benzene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME only | NA | 0.2 | |
| | | | Nervous System (NV) = 3 | Naphthalene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 3 | |
| RME | Construction Worker, N/W | Future: 11 | Hematological (HM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 8 | Isopropylbenzene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Mercury | MET | RME only | NA | 0.1 | |
| | | | Other (OT) = 1 | Xylenes, Total | VOC | RME only | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Respiratory System (RS) = 7 | Isopropylbenzene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| RME | Onsite Child Resident, N/W | Future: 54 | Cardiovascular System (CV) = 1 | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Dermal (DM) = 8 | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 7 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | Developmental System (DV) = 2 | Trichloroethene | VOC | RME+CTE | NA | 0.1 | |
| | | | | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Endocrine (EN) = 1 | Isopropylbenzene | VOC | RME only | NA | 0.1 | |
| | | | | Cobalt | MET | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Gastrointestinal (GI) = 1 | Beryllium | MET | RME only | NA | 0.2 | |
| | | | | Iron | MET | RME only | NA | 1 | |
| | | | Immune System (IM) = 20 | Benzene | VOC | RME+CTE | NA | 4 | |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Child Resident, N/W | Future: 54 | Immune System (IM) = 20 | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 17 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Aluminum | MET | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 2 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Reproductive System (RP) = 1 | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Respiratory System (RS) = 1 | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | Urinary System = 2 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.2 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.3 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.9 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| RME | Onsite Adult Resident, N/W | Future: 45 | Dermal (DM) = 5 | Arsenic | MET | RME+CTE | NA | 0.8 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 4 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 16 | Aluminum | MET | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.01 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 1 | 2-Methylnaphthalene | SVOC | RME only | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Urinary System = 1 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Indoor/Outdoor Commercial Worker, N/W | Future: 4 | Immune System (IM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Nervous System (NV) = 2 | Xylenes, Total | VOC | RME+CTE | NA | 1 | |
| CTE | Construction Worker, N/W | Future: 6 | Hematological (HM) = 1 | Benzene | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 4 | Naphthalene | VOC | RME+CTE | NA | 4 | |
| | | | Respiratory System (RS) = 4 | Naphthalene | VOC | RME+CTE | NA | 4 | |
| CTE | Onsite Child Resident, N/W | Future: 38 | Dermal (DM) = 2 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 17 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 1 | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Onsite Adult Resident, N/W | Future: 42 | Dermal (DM) = 4 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

## Table 6-5. SLERA Step 2 Detected COPECs

| COPEC | Terrestrial | | | | Aquatic/Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|
| | N | W | C | S | $U_{SD}$ | $D_{SD}$ | $D_{SW}$ | $D_{PW}$ |
| **Volatile Organic Compounds** | | | | | | | | |
| Acetone | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Carbon disulfide | ○ | ○ | ○ | ○ | ● | ● | ○ | ● |
| **Semi-Volatile Organic Compounds** | | | | | | | | |
| Benzaldehyde | – | – | ● | ○ | – | ○ | – | ○ |
| bis(2-Ethylhexyl)phthalate | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Di-n-octyl phthalate | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Total HMW PAHs | ○ | ○ | ● | ○ | – | – | – | – |
| **Pesticides** | | | | | | | | |
| alpha-Chlordane | ○ | ○ | ○ | ● | ○ | ○ | LOQ | – |
| gamma-Chlordane | ○ | ○ | ○ | ● | ○ | ○ | ○ | – |
| Total DDD/DDE/DDT | ○ | ○ | ○ | ○ | ● | ○ | ○ | – |
| **Dioxins and Furans** | | | | | | | | |
| Total TEQ (Bird) | – | – | – | ○ | – | ○ | – | ○ |
| Total TEQ (Fish) | – | – | – | – | – | ● | – | ○ |
| Total TEQ (Mammal) | – | – | – | ○ | – | ○ | – | ○ |
| **Total Metals** | | | | | | | | |
| Aluminum | ○ | ○ | ○ | ○ | ○ | ● | ● | LOQ |
| Antimony | ○ | ○ | ○ | ○ | ● | LOQ | ○ | LOQ |
| Arsenic | ○ | ○ | ○ | ○ | ● | ● | ● | ● |
| Barium | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| Cadmium | ○ | ○ | ○ | ○ | ● | ○ | LOQ | ● |
| Calcium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Chromium | ● | ● | ● | ● | ○ | ● | ● | ● |
| Cobalt | ○ | ○ | ● | ● | ○ | ○ | ○ | LOQ |
| Copper | ○ | ○ | ○ | ● | ● | ● | ● | LOQ |
| Iron | ○ | ○ | ○ | ○ | ● | ● | ● | ○ |
| Lead | ○ | ○ | ● | ● | ● | ● | ● | LOQ |
| Magnesium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Manganese | ○ | ○ | ● | ● | ○ | ○ | ○ | ● |
| Mercury | ○ | ● | ● | ● | ● | ○ | ● | ● |
| Nickel | ○ | ○ | ● | ● | ● | ● | ○ | ○ |
| Potassium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Selenium | LOQ | LOQ | ● | ● | ○ | ● | ● | LOQ |
| Silver | ○ | ○ | ○ | ○ | ● | ○ | LOQ | LOQ |
| Sodium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Thallium | ● | ● | ● | ● | ○ | ○ | LOQ | LOQ |
| Vanadium | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Zinc | ○ | ○ | ● | ● | ● | ○ | ○ | ○ |

## Table 6-5. SLERA Step 2 Detected COPECs

**Notes**: COPEC = Constituent of Potential Ecological Concern; N = Northern AOC; W = Western AOC; C = Central AOC; S = Southern AOC; $U_{SD}$ = Upgradient Drainage Sediment; $D_{SD}$ = Downgradient Estuarine Sediment; $D_{SW}$ = Downgradient Estuarine Surface Water; $D_{PW}$ = Downgradient Estuarine Pore Water; ; **–** indicates that data was not evaluated/available for exposure area/medium; ○ indicates that data was evaluated for exposure area/medium, but COI not selected as a direct contact COPEC; ● indicates direct contact COPEC for exposure area/medium; yellow highlighting indicates wildlife COPEC for exposure area/medium; LOQ indicates that COPEC was all non-detect

## Table 6-6. Refined Direct Contact COPECs (Soil)

| COPEC | Surface Soil Refined Hazard Quotient (HQ) | | | |
|---|---|---|---|---|
| | Northern AOC | Western AOC | Central AOC | Southern AOC |
| **Semi-Volatile Organic Compounds** | | | | |
| Benzaldehyde | -- | -- | <1 | -- |
| Total HMW PAHs | -- | -- | **1** | -- |
| **Pesticides** | | | | |
| alpha-Chlordane | -- | -- | -- | <1 |
| gamma-Chlordane | -- | -- | -- | <1 |
| **Total Metals** | | | | |
| Barium | -- | -- | -- | **2** |
| Chromium | <1 | <1 | **1** | **4** |
| Cobalt | -- | -- | **1** | <1 |
| Copper | -- | -- | -- | **30** |
| Lead | -- | -- | <1 | <1 |
| Manganese | -- | -- | <1 | **2** |
| Mercury | -- | <1 | <1 | **2** |
| Nickel | -- | -- | **2** | <1 |
| Selenium | *<1* | *<1* | <1 | <1 |
| Thallium | <1 | <1 | <1 | <1 |
| Zinc | -- | -- | <1 | **11** |

**Notes:** Shading and italics indicate refined COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ); **Bold text** indicates the refined HQ for detected COPECs evaluated using their refined exposure point concentration; -- = Not a COPEC for Exposure Area/Medium; AOC = Area of Concern; COPEC = Chemical of Potential Ecological Concern; highlighting indicates refined HQ > 1

## Table 6-7. Refined Direct Contact COPECs
## (Sediment, Surface Water, and Pore Water)

| COPEC | Sediment Hazard Quotient (HQ) | | SW HQ | PW HQ |
|---|---|---|---|---|
| | Upgradient Drainage | Downgradient Estuarine | | |
| **Volatile Organic Compounds** | | | | |
| Acetone | -- | <1 | -- | -- |
| Carbon disulfide | <1 | <1 | -- | <1 |
| **Semi-Volatile Organic Compounds** | | | | |
| bis(2-Ethylhexyl)phthalate | -- | **48** | -- | -- |
| Di-n-octyl phthalate | -- | **3** | -- | -- |
| **Pesticides** | | | | |
| Total DDD/DDE/DDT | **5** | -- | -- | -- |
| **Dioxins and Furans** | | | | |
| Total TEQ (Fish) | -- | **3** | -- | -- |
| **Total Metals** | | | | |
| Aluminum | -- | <1 | **1** | *267* |
| Antimony | <1 | *<1* | -- | *83* |
| Arsenic | <1 | <1 | <1 | <1 |
| Barium | **1** | <1 | <1 | <1 |
| Cadmium | <1 | -- | *1* | **1** |
| Calcium | -- | -- | <1 | <1 |
| Chromium | -- | <1 | <1 | <1 |
| Cobalt | -- | -- | -- | 9 |
| Copper | <1 | <1 | **1** | *1,042* |
| Iron | <1 | <1 | <1 | -- |
| Lead | <1 | <1 | <1 | *299* |
| Magnesium | -- | -- | **1** | **1** |
| Manganese | -- | -- | -- | <1 |
| Mercury | <1 | -- | <1 | <1 |
| Nickel | <1 | <1 | -- | -- |
| Potassium | -- | -- | <1 | <1 |
| Selenium | -- | <1 | <1 | *850* |
| Silver | <1 | -- | *3* | *5,102* |
| Sodium | -- | -- | **1** | **2** |
| Thallium | -- | -- | *<1* | *463* |
| Zinc | <1 | -- | -- | -- |

**Notes:** Shading and italics indicate refined COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ); **Bold text** indicates the refined HQ for detected COPECs evaluated using their refined exposure point concentration; -- = Not a COPEC for Exposure Area/Medium; COPEC = Chemical of Potential Ecological Concern; PW = Pore Water; SW = Surface Water; highlighting indicates refined HQ > 1

## Table 6-8. Refined Wildlife Dose Rate Model COPECs

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| **Northern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Vanadium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Western AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | **1**/<1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Vanadium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Central AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Total HMW PAHs | <1 | **2**/<1 | <1 | **1**/<1 | **9**/<1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **1**/<1 | **8**/<1 | <1 | **4**/<1 | **5**/<1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Chromium | <1 | **1**/<1 | <1 | <1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Lead | <1 | **2**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Nickel | **1**/<1 | **6/2** | <1 | **4**/<1 | **34/8** | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **1**/<1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **<1** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Southern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | **1**/<1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **6**/<1 | **39/2** | <1 | **22**/<1 | **26**/<1 | -- | -- | -- | -- |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | <1 | **3**/<1 | <1 | -- | -- | -- | -- | -- | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | <1 | **57/6** | **4**/<1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Antimony | -- | -- | -- | **7**/<1 | **55/1** | **1**/<1 | -- | -- | -- | -- |
| Cadmium | <1 | <1 | <1 | <1 | **2**/<1 | <1 | -- | -- | -- | -- |
| Chromium | **1**/<1 | **4**/<1 | <1 | **2**/<1 | **4**/<1 | <1 | -- | -- | -- | -- |
| Copper | **5**/<1 | **11/1** | **3**/<1 | **5**/<1 | **3**/<1 | <1 | -- | -- | -- | -- |
| Lead | **5**/<1 | **15**/<1 | **3**/<1 | **2**/<1 | **5**/<1 | <1 | -- | -- | -- | -- |
| Nickel | <1 | <1 | <1 | <1 | **4**/<1 | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **2**/<1 | **2**/<1 | <1 | -- | -- | -- | -- |

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| Silver | <1 | **2**/<1 | <1 | <1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **2**/<1 | <1 | **1**/<1 | **2**/<1 | <1 | -- | -- | -- | -- |
| **Upgradient Drainage** | | | | | | | | | | |
| **Pesticides** | | | | | | | | | | |
| Total DDD/DDE/DDT | -- | -- | -- | -- | -- | -- | **4**/<1 | <1 | <1 | <1 |
| **Metals** | | | | | | | | | | |
| Lead | -- | -- | -- | -- | -- | -- | **1**/<1 | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **3**/<1 | <1 | <1 | <1 |
| **Downgradient Estuarine** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | -- | -- | **402/40** | **113/11** | **1**/<1 | **4**/<1 |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | -- | -- | -- | -- | -- | -- | <1 | <1 | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | -- | -- | -- | -- | -- | <1 | **2**/<1 |
| **Metals** | | | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | **52/5** | **14/1** | **170/17** | **514/51** |
| Chromium | -- | -- | -- | -- | -- | -- | **3**/<1 | <1 | <1 | <1 |
| Selenium | -- | -- | -- | -- | -- | -- | **3/1** | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **4/1** | <1 | <1 | <1 |

**Notes:** "**5/8**" indicates NOAEL/LOAEL HQs; "<1" indicates both NOAEL and LOAEL HQs are less than 1; -- = Not a COPEC for Chemical/Exposure Area; AR = American Robin; COPEC = Chemical of Potential Ecological Concern; MK = Mink; MV = Meadow Vole; MW = Marsh Wren; NB = Northern Bobwhite; OS = Osprey; RC = Raccoon; RF = Red Fox; RH = Red-Tailed Hawk; SS = Short-Tailed Shrew; highlighting indicates LOAEL HQ > 1

# Appendix A

## Trench and Direct Push Technology Boring Logs

# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL FS |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-11A |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 5/28/15 | **Remarks:** Northern 10' section → A, B, C<br>No Sample, No Fill. |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 12' | |
| **Dimensions:** 2' X 10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

start 1500

| Depth ~~(inches)~~ ft | Field Screening Result (PPM) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5 | 0.0 | | | | Ground Cover/Topsoil |
| 1.5'-10' | ↓ | | | | Dry lt brown fine sand trace silt |
| 10-11 | ↓ | | | | moist lt brown fine sand with silt |
| 11'-12' | ↓ | | | | moist to wet lt brown fine silty sand |
| | | | | | |
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| | | | | | |
| | | | | | |

stop 1545

# TEST PIT LOG

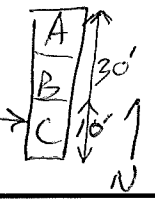
| | |
|---|---|
| | **Project Name:** Project 15 CDL FS |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-11B |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 5/28/15 | **Remarks:** Northern Central 10' section, "B" A B C |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 12' | |
| **Dimensions:** 2' x 10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5 | 0.0 | | | | Ground Cover/Topsoil |
| 1.5-6' | 0.0 | | | | Moist lt brown to reddish brown fine silty sand. |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 6'-8' | 0.0 | | | | Metal Scrap & circular lid, Rebar, Glass bottles. |
| | | | | | |
| 8'-11.5' | 1.4 | | | | Moist lt brown fine Sandy silt |
| 12' | 5.6 | | 12' | | Stained dark gray soil, Strong odor |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

CDL-TP11-B-00-12
1155
No Dioxin analysis

# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL FS |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-11C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 5/28/15 | **Remarks:** Southern 10' section C |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 12' | |
| **Dimensions:** 2' x ~~30~~ 10' (5/28/15) | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |



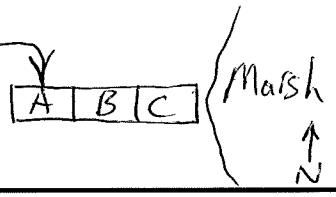

| Depth Feet (~~Inches~~) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5' | 0.0 | | | | ~~See~~ SC 5/28/15 ~~Central~~ Ground Cover/Topsoil |
| 1.5-6' | 0.0 | | | | Moist lt brown to reddish brown |
| | | | | | fine Silty Sand |
| | | | | | |
| | | | | | |
| | | | | | |
| 6'-8' | 0.0 | | | | Metal Can found. Waste layer |
| | | | | | |
| | | | | | |
| 11' | 8.6 | | | | Stained dark gray soil, Strong odor |
| 12 | 9.5 | | | | |
| | ~~8~~ 4.0 | Sample Bucket ID | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Sample

CDL-TP11C-0004/2
1420
Nodioxin

# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-12A |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/2/15 | **Remarks:** |
| **Equipment Used:** CASE 58E | |
| **Total Depth:** 11' | |
| **Dimensions:** 2'x10' | |
| **Water Table:** 11' | |
| **Ground Surface Elev.:** | |




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-9.5' | 0.0 | | | | Fill Material - Metal scraps, bricks |
| | | | | | glass bottles |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 9.5-11 | 0.0 | | | | Native Sands. Moist olive gray |
| | | | | | fine sands. |
| 11' | | | | | Water encountered @ 11' bgs. |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-12B |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/2/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | Central 1/3 Trench → A B C (Marsh ↑ N) |
| **Total Depth:** 8' | |
| **Dimensions:** 2 X 10' | |
| **Water Table:** 8' | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0 - 8' | 0.0 | | | | Fill material - Scrap metal, |
| | | | | | bricks, springs, car parts (muffler) |
| | | | | | glass bottles. |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 8' | 0.0 | | | | Encountered Water |
| | | | | | |
| | | | | | |
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# TEST PIT LOG

**Project Name:** Project 15 CDL
**Project Number:**
**Project Manager:** Lynne France
**Location:** Wallops Island, VA
**Test Pit ID:** TP-12C
**Logged By:** S. Cleaver
**Contractor:** CDM Smith

**Date Excavated:** 6/2/15
**Equipment Used:** CASE 580E
**Total Depth:** 5'
**Dimensions:** 2x10'
**Water Table:** 5' bgs
**Ground Surface Elev.:**

**Remarks:**

East 1/3 Trench → A | B | C

Marsh ↑ N

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-5' | 0.0 | | | | Fill, bricks, lid to car, metal |
| | | | | | scraps. |
| | | | | | |
| 4' | 0.0 | | | | White colored broken concrete |
| | | | | | like agregate. |
| 5' | 0.0 | | | | Water Encountered. Fill remains |
| | | | | | present. fill in East most side wall |
| | | | | | closest to marsh. |
| | | | | | |
| | | | | | |
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Samples

CDL-TP12C-00-009 @ 4.5-5' bgs

# TEST PIT LOG

| | |
|---|---|
| | Project Name: Project 15 CDL |
| | Project Number: |
| | Project Manager: Lynne France |
| | Location: Wallops Island, VA |
| | Test Pit ID: TP-13A |
| | Logged By: S. Cleaver |
| | Contractor: CDM Smith |
| Date Excavated: 6/4/15 | Remarks: West 10' Section → A \| B \| C |
| Equipment Used: CASE 580E | |
| Total Depth: 10' | |
| Dimensions: 2'x 10' | |
| Water Table: NA | |
| Ground Surface Elev.: | |

| Depth ~~(inches)~~ Feet | Field Screening Result ~~(ppm)~~ | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1 | 0.0 | | | | Topsoil / Ground Cover |
| 1-6 | 0.0 | | | | Moist yel/orange fine sands |
| | | | | | No debris present. |
| 6-10 | 108 | | | | Moist dark gray fine Sand, |
| | | | | | Staining from 6'-10'. Very Strong |
| | | | | | odor present. |
| | | | | | |
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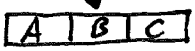
# TEST PIT LOG

| | |
|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | Lynne France |
| Location: | Wallops Island, VA |
| Test Pit ID: | TP-13B |
| Logged By: | S. Cleaver |
| Contractor: | CDM Smith |
| Date Excavated: | 6/4/15 |
| Equipment Used: | CASE 580E |
| Total Depth: | 5' |
| Dimensions: | 2' x 10' |
| Water Table: | 5' bgs |
| Ground Surface Elev.: | |

Remarks:

Central 10' section →




| Depth ~~(inches)~~ Feet | Field Screening Result ppm | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1 | 0.0 | | | | Topsoil / Ground Cover |
| 1-3 | 0.0 | | | | Moist yel orange fine Sands. |
| | | | | | No debris. |
| 3-5 | ~~6.0@3'~~ 280@5' | | | | Moist-Wet dark grayish black |
| | | | | | fine sands. Stained & Strong odor. |
| | | | | | Almost appears to be pure product |
| | | | | | Sitting @ 5' bgs. Water encountered |
| | | | | | @ 5'. Staining into water table |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# TEST PIT LOG

| | |
|---|---|
| | Project Name: Project 15 CDL |
| | Project Number: |
| | Project Manager: Lynne France |
| | Location: Wallops Island, VA |
| | Test Pit ID: TP-13C |
| | Logged By: S. Cleaver |
| | Contractor: CDM Smith |
| Date Excavated: 6/4/15 | Remarks: East 10' Section → A \| B \| C |
| Equipment Used: CASE 580E | |
| Total Depth: 5' | |
| Dimensions: 2'x10' | |
| Water Table: 5' | |
| Ground Surface Elev.: | |

| Depth ~~(inches)~~ Feet | Field Screening Result ~~ppm~~ | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1 | 0.0 | | | | Topsoil / Groundcover |
| 1-2 | 0.0 | | | | Moist light brown fine sand |
| | | | | | ~~SC 6/4/15~~ ~~debris.~~ Scrap metal & terra cotta pipe. |
| 2-5 | 409 | | | | moist-wet dark gray fine sand. |
| | | | | | Staining & strong odor present. |
| | | | | | Water encountered @ 5' bgs. |
| | | | | | Staining into water table. |
| | | | | | |
| | | | | | |
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# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL FS |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-14A |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/1/15 | **Remarks:** SC 6/1/15 |
| **Equipment Used:** CASE 580E | ~~Central~~ |
| **Total Depth:** 12' | Western 1/3 Trench [A] B C |
| **Dimensions:** 2' x 10' | * No Waste observed |
| **Water Table:** N/A | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Ground Cover/Topsoil |
| 1'-8' | 0.0 | | | | moist brown silt and fine sand |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 8'-12' | 0.0 | | | | moist yel orange fine sand |
| | | | | | |
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# TEST PIT LOG

| | |
|---|---|
| **Project Name:** | Project 15- CDL ES |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-14B |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/1/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 12' |
| **Dimensions:** | 2' x 10' |
| **Water Table:** | NA |
| **Ground Surface Elev.:** | |

**Remarks:**

Central 1/3 Trench → (A | B | C)

N ↑

*No Waste Observed

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Ground Cover / Topsoil |
| 1'-2.5' | 0.0 | | | | Oyster bed w/in moist |
| | | | | | brown clayey silt trace sand (fine) |
| 2.5'-8' | 0.0 | | | | ~~moist yel orange fine sand~~ SC 6/1/15 |
| | | | | | moist brown clayey silt trace sand (fine) |
| 8'-12' | 0.0 | | | | moist yel orange fine sand. |
| | | | | | |
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# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL FC |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-14C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/1/15 | **Remarks:** Eastern 1/3 Trench → |
| **Equipment Used:** CASE 580E | A \| B \| C |
| **Total Depth:** 12' | * No Waste Observed |
| **Dimensions:** 2' X 10' | ↑N |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5' | 0.0 | | | | Topsoil/Ground Cover |
| 1.5-6.5 | 0.0 | | | | moist brown clayey silt, trace fine sand |
| | | | | | |
| | | | | | |
| 6.5-12' | 0.0 | | | | moist yel orange fine sand |
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# TEST PIT LOG

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|---|---|
| **Project Name:** | Project 15 CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-15A |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/8/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 5' |
| **Dimensions:** | ~~2'x10'~~ 6/10/15 2'X5' |
| **Water Table:** | NA |
| **Ground Surface Elev.:** | |

**Remarks:**

West 10' Section →

| A | B | C |
|---|---|---|

↑ N

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-~~1.5'~~ 2' 6/10/15 | 0.0 | | | | Topsoil / Ground Cover |
| | | | | | |
| ~~1.5'~~ 6/10/15 | | | | | |
| 2'-3' | 0.0 | | | | ~~Native sands~~ 6/10/15 Dry brownish Tan |
| | | | | | fine sand. Native sands |
| 3'-5' | 0.0 | | | | moist yel orange fine sand |
| | | | | | well-sorted, loose density. Native Sands |
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# TEST PIT LOG

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|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** |
| | **Test Pit ID:** TP-15B |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/8/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | Central 10' Section → A \| B \| C ↑ N |
| **Total Depth:** 9' | |
| **Dimensions:** 2'X10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1' | 0.0 | | | | Topsoil / Ground cover, Patch of concrete like material @ 1' bgs |
| 1'-4' | 0.0 | | | | Topsoil, brown fine sand mixed throughout |
| 4'-9' | 0.0 | | | | moist yel orange fine sand, well sorted, Loose density, Native Sands. |

# TEST PIT LOG

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|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-15C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/8/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | East 10' Section → |
| **Total Depth:** 8' | A \| B \| C |
| **Dimensions:** 2' x 10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-2' | 0.0 | | | | Ground Cover/Topsoil. On |
| | | | | | surface very little scrap metal |
| | | | | | pieces observed, 1 bottle observed. |
| 2'-8' | 0.0 | | | | moist ye/ orange fine sand |
| | | | | | well sorted. very loose. Caving @ 8'bgs. |
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# TEST PIT LOG

**Project Name:** Project 15 CDL
**Project Number:**
**Project Manager:** Lynne Pearce
**Location:** Wallops Island, VA
**Test Pit ID:** TP-16A
**Logged By:** S. Cleaver
**Contractor:** CDM Smith

**Date Excavated:** 6/3
**Equipment Used:** CASE 2'x10'
**Total Depth:** 10'
**Dimensions:** 2'x10'
**Water Table:** NA
**Ground Surface Elev.:**

**Remarks:**
Northern 1/3 section → A / B / C ↕ 10' ↑ N

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | | | | | Top Soil / Ground Cover |
| 1'-10' | | | | | Dry yellowish orange fine sands. Well sorted. Native Sands |
| | | | | | Caving occurring. |
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# TEST PIT LOG

**Project Name:** Project 15 CDL
**Project Number:**
**Project Manager:** Lynne France
**Location:** Wallops Island, VA
**Test Pit ID:** TP-116B
**Logged By:** S. Cleaver
**Contractor:** COM Smith

**Date Excavated:** 6/3/15
**Equipment Used:** CASE 580E
**Total Depth:** 11'
**Dimensions:** 2' x 10'
**Water Table:** NA
**Ground Surface Elev.:**

**Remarks:**

Central 1/3 Section → A / B / C ↕ 10'

N ↑

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1-11' | 0.0 | | | | Native dry yel orange fine sand. well sorted. Very loose |
| | | | | | Large Collapse occurred. stop @ 11' bgs |
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# TEST PIT LOG

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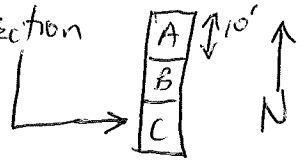
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallop's Island, VA |
| | **Test Pit ID:** TP-16C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/3/15 | **Remarks:** Southern 1/3 section; Native Sands |
| **Equipment Used:** CASE 580 E | |
| **Total Depth:** 11' | |
| **Dimensions:** 2' x 10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1' | 0.0 | | | | Topsoil/Ground Cover |
| 1-11' | 0.0 | | | | Native Dry-Moist yel/orange fine sand, well-sorted, loose. Caving occurring. |
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# TEST PIT LOG

**Project Name:** Project 15 CDL
**Project Number:**
**Project Manager:** Lynne France
**Location:** Wallops Island, VA
**Test Pit ID:** TP-17A
**Logged By:** S. Cleaver
**Contractor:** CDM Smith

**Date Excavated:** 6/3/15
**Equipment Used:** CASE 580E
**Total Depth:** 10'
**Dimensions:** 2' x 10'
**Water Table:** N/A
**Ground Surface Elev.:**

**Remarks:**
West 1/3 section → A | B | C ↑ N
No fill observed.

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1'-10' | 0.0 | | | | moist yel/orange fine sand |
| | | | | | well sorted, very loose, |
| | | | | | collapsing @ 10'. No fill |
| | | | | | observed. |
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# TEST PIT LOG

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|---|---|
| **Project Name:** | Project 15 CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-17B |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/3/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 12' |
| **Dimensions:** | 2' x 10' |
| **Water Table:** | NA |
| **Ground Surface Elev.:** | |

**Remarks:**

Central 1/3 Section

A | B | C

Little fill near surface

N ↑

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1" | 0.0 | | | | Topsoil / Ground Cover |
| 1'-2' | 0.0 | | | | Very few metal pieces at surface mixed into sands |
| | | | | | |
| 2'-12' | 0.0 | | | | moist yel orange fine Sand well-sorted, very loose, collapsing. |
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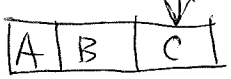
# TEST PIT LOG

**Project Name:** Project IS CDL
**Project Number:**
**Project Manager:** Lynne France
**Location:** Wallops Island, VA
**Test Pit ID:** TP-17C
**Logged By:** S. Cleaves
**Contractor:** CDM Smith

**Date Excavated:** 6/3/15
**Equipment Used:** CASE 580 E
**Total Depth:** 12'
**Dimensions:** 2 X 10'
**Water Table:** N/A
**Ground Surface Elev.:**

**Remarks:**

East 1/3 section




Little fill at surface

N

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1' | 0.0 | | | | Topsoil / Ground Cover |
| ~~1'-2'~~ 6/3/15 | | | | | |
| ~~6/3/15~~ 2 1'-2' | 0.0 | | | | A couple pieces of blue plastic |
| | | | | | mixed in sand, also scrap metal. |
| | | | | | very few pieces. All w/in native sands |
| 2'-12' | 0.0 | | | | Moist yel orange fine sand |
| | | | | | well-sorted. Very loose. Caving occurring |
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# TEST PIT LOG

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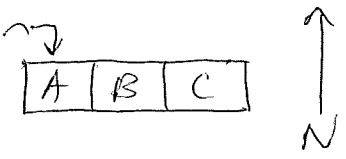
|---|---|
| **Project Name:** | Project IS CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallop's Island, VA |
| **Test Pit ID:** | TP-18A |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/9/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 12' |
| **Dimensions:** | 2 X 10' |
| **Water Table:** | NA |
| **Ground Surface Elev.:** | |

**Remarks:**

West 10' Section




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0 - 1' | 0.0 | | | | Topsoil / Ground Cover |
| 1' - 6' | 0.0 | | | | Topsoil / Fill Waste, Debris |
| | | | | | Glass, metal scraps. |
| 6' - 12' | 0.0 | | | | Moist-wet olive gray silty clay |
| | | | | | trace fine sand, (Fatty). |
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SC 6/9/15
~~EDC-TP18B-0-~~ ~~008~~
~~@1200~~

# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-18B |
| | **Logged By:** Si Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/9/15 | **Remarks:** Central 10' section → A \| B \| C ↑ N |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 12' | |
| **Dimensions:** 2 x 10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

| Depth (inches) 0-6' Topsoil/ground cover | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description | |
|---|---|---|---|---|---|---|
| 0-6' | 0.0 | | | | Topsoil/Fill Waste, Glass, | |
| | | | | | Debris, metal scraps | CDL-TP18B-00-008 @ 1200 |
| 6'-12' | 0.0 | | | | Moist-wet olive gray silty | |
| | | | | | clay, trace fine sand (fat) | |
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# TEST PIT LOG

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|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-18C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** COM Smith |
| **Date Excavated:** 6/9/15 | **Remarks:** East 10' Section → A \| B \| C ↑ N |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 4.5' | |
| **Dimensions:** 2'X 10' | |
| **Water Table:** 4.5' | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5' | 0.0 | | | | Topsoil / Ground Cover |
| 1.5-4.5' | 0.0 | | | | Waste/Fill Debris, Glass bottles, plates, Metal Scraps |
| | | | | | |
| | | | | | |
| 4.5' | ~~0.0~~ 6/9/15 | | | | Water ~~Observed~~ E 6/9/15 Encountered |
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# TEST PIT LOG

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|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-19A |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/9/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | Northwest 10' Section → A B C ↑ N |
| **Total Depth:** 6' | |
| **Dimensions:** 2' x 10' | |
| **Water Table:** 6' | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil/Ground Cover |
| 1'-6' | 0.0 | | | | Fill/Waste, Glass bottles, |
| | | | | | metal scraps, mixed w/in Topsoil. |
| 6' | | | | | Water Encountered. |
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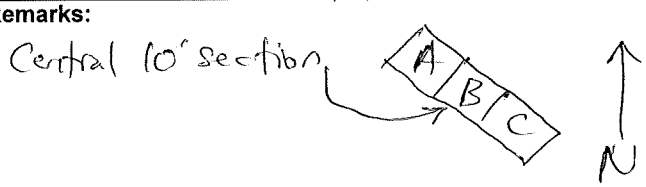
CDL-TP19A-00-009 @ 1620 4-4.5' bgs

# TEST PIT LOG

| | |
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-19B |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/9/15 | **Remarks:** |
| **Equipment Used:** CASE 580 E | Central 10' section  |
| **Total Depth:** 5' | |
| **Dimensions:** 2' x 10' | |
| **Water Table:** 5' | |
| **Ground Surface Elev.:** | |



| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil/Ground Cover |
| 1'-5' | 0.0 | | | | Fill/Waste, Glass bottles |
| | | | | | bricks, metal scraps. |
| 5' | | | | | Water Encountered |
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# TEST PIT LOG

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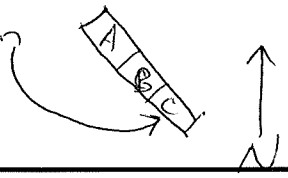
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-19C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/9/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | Southeast 10' Section  |
| **Total Depth:** 3.5' | |
| **Dimensions:** 2'X 10' | |
| **Water Table:** 3.5' | |
| **Ground Surface Elev.:** | |



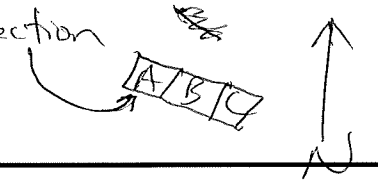
| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1'-3.5' | 0.0 | | | | Fill Waste, Railroad Ties, old toilet bowl, glass bottles, scrap metal. |
| 3.5' | ~~0~~ 6/9/15 | | | | Water Encountered |

# TEST PIT LOG

| | |
|---|---|
| **Project Name:** | Project 15 CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-20A |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/8/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 4' |
| **Dimensions:** | 2'x 10' |
| **Water Table:** | 4' |
| **Ground Surface Elev.:** | |

**Remarks:**

~~Northern~~ sc 6/8/15 Western 10' Section




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-3.5' | 0.0 | | | | Topsoil / Ground Cover, Not Native. |
| 3.5' | 0.0 | | | | Metal Pipe observed. |
| 4' | | | | | Encounter Water. No Native material ~~ft~~ sc 6/8/15 observed 0'-4' (water) |
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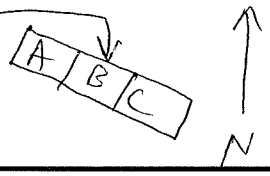
# TEST PIT LOG

| | |
|---|---|
| **Project Name:** | Project 15 CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-20B |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/8/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 5.5' |
| **Dimensions:** | 2'X10' |
| **Water Table:** | 5.5' |
| **Ground Surface Elev.:** | |

**Remarks:**

Central 10' section




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil/Ground Cover |
| 1-4' | 0.0 | | | | Moist brown sand w/ some fill material present |
| 3' | 0.0 | | | | bluish material observed |
| | | | | | |
| ~~4'~~ 6/8/15 | | | | | ~~Water encountered~~ SC 6/8/15 |
| 4'-5' | 0.0 | | | | Moist-wet black burn material |
| | | | | | observed. Charred wood, with burn smell. |
| 5.5' | | | | | Water encountered. |
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# TEST PIT LOG

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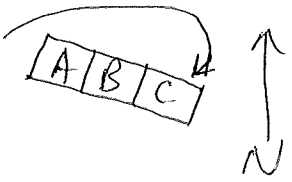
|---|---|
| | **Project Name:** Project 15 CAL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-20C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CAM Smith |
| **Date Excavated:** 6/8/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | Eastern 10' Section  |
| **Total Depth:** 1.5' | |
| **Dimensions:** 2 x 10' | |
| **Water Table:** 1.5' | |
| **Ground Surface Elev.:** | |



| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5' | 0.0 | | | | Topsoil / Ground Cover. No Fill. |
| 1.5' | | | | | Water Observed |
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# TEST PIT LOG

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|---|---|
| **Project Name:** | Project 85-CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne Franco |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-21A |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/9/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 4.5' |
| **Dimensions:** | 2' X 10' |
| **Water Table:** | 4.5' |
| **Ground Surface Elev.:** | |

**Remarks:**

North 10' Section → A / B / C

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1.5' | 0.0 | | | | Topsoil/Ground Cover |
| | | | | | |
| 1.5'-3' | 0.0 | | | | moist lt brown fine sand. |
| 3' | 1.5 | | | | Debris observed, glass, metal |
| | | | | | scraps. |
| 4.5' | | | | | Water observed |
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Sample

CDL-TP21A-00-007 @ 0915

# TEST PIT LOG

| | |
|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | Lynne France |
| Location: | Wallops Island, VA |
| Test Pit ID: | TP-21B |
| Logged By: | S. Cleaver |
| Contractor: | CDM Smith |
| Date Excavated: | 6/9/15 |
| Equipment Used: | CASE 580E |
| Total Depth: | 4' |
| Dimensions: | 2' x 10' |
| Water Table: | 4' |
| Ground Surface Elev.: | |

Remarks:

Central 10' Section → A / B / C ↑ N

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1.5' | 0.0 | | | | Topsoil / Ground Cover |
| 1.5' | 0.0 | | | | Bluish Corroded Material in side wall |
| | | | | | |
| | | | | | |
| | | | | | |
| 3'-4' | 0.0 | | | | bluish corroded material observed. w/ bottles |
| | | | | | |
| 4' | | | | | Water observed |
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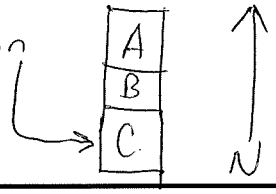
# TEST PIT LOG

**Project Name:** Project 15 CDL
**Project Number:**
**Project Manager:** Lynne France
**Location:** Wallops Island, VA
**Test Pit ID:** TP-21
**Logged By:** S. Cleaver
**Contractor:** CDM Smith

**Date Excavated:** 6/9/15
**Equipment Used:** CASE 580E
**Total Depth:** 4.5'
**Dimensions:** 2'x 10'
**Water Table:** 4'
**Ground Surface Elev.:**

**Remarks:**

South 10' Section




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1.5' | 0.0 | | | | Topsoil/Ground Cover |
| 1.5'-4' | 0.0 | | | | Moist to wet Tan fine silty sand. |
| | | | | | |
| 4' | | | | | Water Encountered, last scoop |
| | | | | | ~~scoops~~ Water table contained a large |
| | | | | | amount of debris, mix of glass, wood, & metal scraps. |
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# TEST PIT LOG

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|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-22A |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/5/15 | **Remarks:** North 10' section → A, B, C; N |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 4' | |
| **Dimensions:** 2' X 10' | |
| **Water Table:** 3' | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1' | | | | | Bluish, corroded material. |
| 1'-3' | 0.0 | | | | Moist-wet yel orange fine silty sand. |
| | | | | | |
| 3' | | | | | Water encountered |
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# TEST PIT LOG

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|---|---|
| | **Project Name:** Project is CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-22B |
| | **Logged By:** S. Clemmer |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/5/15 | **Remarks:** Central 10' section → A, B, C ↑ N |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 3' | |
| **Dimensions:** 2'×10' | |
| **Water Table:** 2' | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (PPM) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| ~~+ SC 6/5/15~~ | | | | | ~~Bluish corrosion looking material~~ SC 6/5/15 |
| 1'-2' | 0.0 | | | | moist-wet yel orange to olive brown fine silty sand. |
| | | | | | |
| 2' | | | | | Water encountered |
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# TEST PIT LOG

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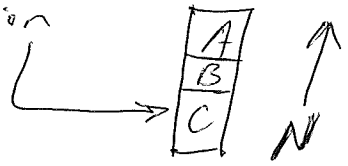
|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-22C |
| | **Logged By:** S. Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/5/15 | **Remarks:** South 10' section  |
| **Equipment Used:** CASE 580E | |
| **Total Depth:** 2' | |
| **Dimensions:** 2' x 10' | |
| **Water Table:** 1' | |
| **Ground Surface Elev.:** | |



| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1' | | | | | Water encountered. |
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# TEST PIT LOG

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|---|---|
| | **Project Name:** Project 15 CDL |
| | **Project Number:** |
| | **Project Manager:** Lynne France |
| | **Location:** Wallops Island, VA |
| | **Test Pit ID:** TP-23A |
| | **Logged By:** Sc Cleaver |
| | **Contractor:** CDM Smith |
| **Date Excavated:** 6/4/15 | **Remarks:** |
| **Equipment Used:** CASE 580E | West 10' Section → A \| B \| C ↑ N |
| **Total Depth:** 10' | Native Sands |
| **Dimensions:** 2' x 10' | |
| **Water Table:** NA | |
| **Ground Surface Elev.:** | |

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1'-10' | 0.0 | | | | Moist yel Orange fine Sand. |
| | | | | | well-Sorted, loose. Caving occurring @ 10' bg.s. |
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# TEST PIT LOG

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|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | Lynne France |
| Location: | Wallops Island, VA |
| Test Pit ID: | TP-23B |
| Logged By: | S. Cleaver |
| Contractor: | CDM Smith |
| Date Excavated: | 6/4/15 |
| Equipment Used: | CASE 580E |
| Total Depth: | 10' |
| Dimensions: | 2' x 10' |
| Water Table: | NA |
| Ground Surface Elev.: | |

Remarks:

Central 10' section → A | B | C ↑ N

Native Sands

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1'-10' | 0.0 | | | | Moist yel orange fine sand. well-sorted, very loose |
| | | | | | |
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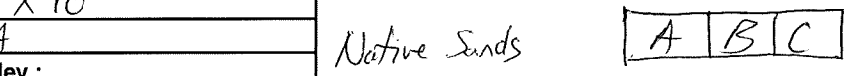
# TEST PIT LOG

| | |
|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | Lynne France |
| Location: | Wallops Island, VA |
| Test Pit ID: | TP-23C |
| Logged By: | S. Cleaver |
| Contractor: | Com Smith |
| Date Excavated: | 6/4/15 |
| Equipment Used: | CASE 580E |
| Total Depth: | 10' |
| Dimensions: | 2'X 10' |
| Water Table: | NA |
| Ground Surface Elev.: | |

Remarks:

East 10' section

Native Sands




N

| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil / Ground Cover |
| 1'-10' | 0.0 | | | | Moist yel orange fine Sand well sorted. very loose. Collapsing @ 10' bgs |
| | | | | | can't get deeper. |
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# TEST PIT LOG

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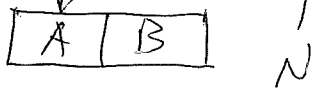
|---|---|
| **Project Name:** | Project ISCAL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-24A |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/10/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 12' |
| **Dimensions:** | 2' x 10' |
| **Water Table:** | NA |
| **Ground Surface Elev.:** | |

**Remarks:**

West 10' Section




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description | Sample |
|---|---|---|---|---|---|---|
| 0'-4' | 0.0 | | | | Topsoil / Ground Cover | |
| 4'-4' | 0.0 | | | | Dry yel orange fine sand. | |
| 4'-12' | 1.9 | | | | start of dry grayish fine sand, strong odor. | |
| | | | | | | |
| 5.5' | 492.0 | | | | | CDL-TP24A-00-012 @ 1015 5.5'-6' bgs |
| | | | | | | |
| 11'-12' | 616.0 | | | | Paint Cans, Paste like creame-white material. | Duplicate CDL-TP24A-01-012 of parent CDL-TP24A-00-012 |
| | | | | | | |
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# TEST PIT LOG

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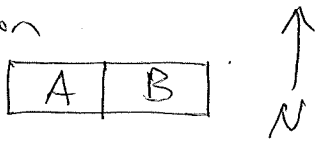
|---|---|
| **Project Name:** | Project 15 CDL |
| **Project Number:** | |
| **Project Manager:** | Lynne France |
| **Location:** | Wallops Island, VA |
| **Test Pit ID:** | TP-24B |
| **Logged By:** | S. Cleaver |
| **Contractor:** | CDM Smith |
| **Date Excavated:** | 6/10/15 |
| **Equipment Used:** | CASE 580E |
| **Total Depth:** | 12' |
| **Dimensions:** | 2' x 10' |
| **Water Table:** | NA |
| **Ground Surface Elev.:** | |

**Remarks:**

East 10' section




| Depth (inches) | Field Screening Result (ppm) | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0-1' | 0.0 | | | | Topsoil/Ground Cover |
| 1'-6' | | | | | Dry orangish brown fine sand. |
| 6' | 110.0 | | | | compacted sand. |
| 6'-12' | | | | | Stained, strong odor, fine sand, gray |
| | | | | | in color. |
| 10' | 160.0 | | | | |
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# TEST PIT LOG 05/12/16

| | |
|---|---|
| | Project Name: ~~CDL-15~~ Project 15 CDL |
| | Project Number: |
| | Project Manager: |
| | Location: Wallops Island, VA |
| | Test Pit ID: TP-25A |
| | Logged By: NA-ASIA ELLIS |
| | Contractor: CDM Smith |
| Date Excavated: 5/12/16 | Remarks: NORTHERN → A, B, C 10' SECTION ↑ N |
| Equipment Used: Deere 160G | |
| Total Depth: 18' BGS | |
| Dimensions: 3'X10' | |
| Water Table: 17' bgs | |
| Ground Surface Elev.: | |

| Depth ~~(inches)~~ FEET | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0.0-0.5' | 0.0 | | | | TOPSOIL/GROUNDCOVER, |
| 0.5'-1' | 0.0 | | | | MOIST LIGHT BROWN FINE SANDS |
| 1'-1.5' | 0.0 | | | | MOIST DARK BROWN, FINE SANDS |
| 1.5'-17' | 0.0 | | | | MOIST, ~~LIGHT BROWN~~ YELLOWISH ORANGE FINE SANDS (NE 5-12-2016) |
| 17' | 0.0 | | | | WATER ENCOUNTERED |
| 17'-18' | 0.0 | | | | WET LIGHT BROWN TO GREENISH GRAY FINE SANDS |

# TEST PIT LOG

| | |
|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | |
| Location: | WALLOPS ISLAND, VA |
| Test Pit ID: | TP-25B |
| Logged By: | NA-ASIA ELLIS |
| Contractor: | CDM Smith |
| Date Excavated: | 5/12/2011 |
| Equipment Used: | Deere 160G |
| Total Depth: | 17' BGS |
| Dimensions: | 3' X 10' |
| Water Table: | 17' bgs |
| Ground Surface Elev.: | |

Remarks:

~~NORTHERN~~ ~~SECTION~~ SEPTIC

A
B
C

Central 10' Section

N ↑

| Depth ~~(inches)~~ FEET | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0.0'-0.5' | 0.0 | | | | MOIST TOPSOIL / GROUNDCOVER |
| 0.5'-1' | 0.0 | | | | MOIST LIGHT BROWN FINE SANDS |
| 1'-1.5' | 0.0 | | | | MOIST DARK BROWN FINE SANDS |
| 1.5'-17' | 0.0 | | | | MOIST YELLOWISH ORANGE FINE SANDS |
| 17' | 0.0 | | | | WATER ENCOUNTERED |
| | | | | | WET LIGHT BROWN TO GREENISH GRAY |
| | | | | | FINE SANDS |
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# TEST PIT LOG

| | |
|---|---|
| | Project Name: ~~CDL-15~~ Project 15 CDL (05/12/16) |
| | Project Number: |
| | Project Manager: |
| | Location: WALLOPS ISLAND, VA |
| | Test Pit ID: ~~TP-25C~~ |
| | Logged By: NA-ASIA ELLIS |
| | Contractor: CDM Smith |
| Date Excavated: 5/12/2016 | Remarks: (05/12/16) ~~NORTHERN 10' SECTION~~ → A; B; Southern 10' section → C; ↑ N |
| Equipment Used: Deere 160G | |
| Total Depth: 17' | |
| Dimensions: 3'x10' | |
| Water Table: 17' bgs | |
| Ground Surface Elev.: | |

| Depth ~~(inches)~~ FEET | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0.0-0.5' | 0.0 | | | | MOIST TOPSOIL / GROUNDCOVER |
| 0.5'-1' (NG 05/12/16) | 0.0 | | | | MOIST LIGHT BROWN FINE SANDS |
| 1-1.5' | 0.0 | | | | MOIST DARK BROWN FINE SANDS |
| 1.5'-17' | 0.0 | | | | MOIST YELLOWISH ~~BROWN~~ ORANGE FINE SANDS (NG 05/12/2016) |
| 17' | 0.0 | | | | WATER ENCOUNTERED |
| | | | | | WET LIGHT BROWN TO GREENISH GRAY |
| | | | | | FINE SANDS |

Sample

Soil
16.5-17.5' bgs
CDL-TP25C-00-03

# TEST PIT LOG

Project Name: Project 15-CDL
Project Number:
Project Manager:
Location: Wallops Island, VA
Test Pit ID: TP-26A
Logged By: S. Cleaver
Contractor: S. CDM Smith
Date Excavated: 5/11/16
Equipment Used: Deere 160G
Total Depth: 15' bgs
Dimensions: 3'x10'
Water Table: 14' bgs
Ground Surface Elev.:
Remarks:

Northern 10' section → A, B, C; Debris; N

| Depth (inches) | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-0.5' | 0.0 | | | | Ground Cover |
| 0.5'-4' | 0.0 | | | | Moist lt brown fine sand. |
| 4'-8.5' | 0.0 | | | | Debris (Tractor tire, Drums) in |
| | | | | | Southern portion of 26A. Mixed w/ moist brown fine sand |
| 8.5'-12.5' | 0.0 | | | | Moist grayish brown fine sand, |
| | | | | | fining downward. Very loose sand |
| | | | | | Caving @ depth 12.5' bgs |
| 12.5'-14' | 0.0 | | | | Moist-wet Greenish Gray Silty Sand |
| | | | | | ~~trace fine sand.~~ SCS 5/11/16 |
| 14' bgs | | | | | Water Encountered |
| 14'-15' | 0.0 | | | | Wet Greenish Gray Silty Clay |
| | | | | | very soft clay |
| | | | | | |
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# TEST PIT LOG

| | |
|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | |
| Location: | Wallops Island, VA |
| Test Pit ID: | TP-26B |
| Logged By: | S. Cleaver |
| Contractor: | CDM Smith |
| Date Excavated: | 5/11/16 |
| Equipment Used: | Deere 160G |
| Total Depth: | 14' bgs |
| Dimensions: | 3'x10' |
| Water Table: | 13.5' bgs |
| Ground Surface Elev.: | |

Remarks:

Central 10' Section → A / B / C ↑ N

| Depth (inches) | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-0.5 | 0.0 | | | | Ground Cover |
| 0.5'-4' | 0.0 | | | | Moist lt brown fine Sand |
| 4'-5.5' | 0.0 | | | | Debris (Tractor Tire, Drums). Mixed |
| | | | | | w/ moist brown fine sand. |
| | | | | | |
| 5.5'-12.5' | 0.0 | | | | Moist grayish brown fine Sand, fining |
| | | | | | downward. Very Loose Sand. |
| 12.5'-13.5' | 0.0 | | | | moist-wet Greenish gray silty sand. |
| | | | | | |
| 13.5' | | | | | Water Encountered |
| 13.5'-14' | 0.0 | | | | Wet Greenish Gray Silty clay |
| | | | | | very soft clay.) |
| | | | | | |
| | | | | | |
| | | | | | |

Sample

Soil
CDL-TP26B-00
010
@ 4.5'-5' bgs
SOCs, SVOCs, metals.

# TEST PIT LOG

Project Name: Project 15 CDL
Project Number:
Project Manager:
Location: Wallops Island, VA
Test Pit ID: TP-26C
Logged By: S. Cleaver
Contractor: CDM Smith

Date Excavated: 5/11/16
Equipment Used: Deere 160G
Total Depth: 16' bgs
Dimensions: 3' x 10'
Water Table: 15' bgs
Ground Surface Elev.:

Remarks:

Southern 10' section → A / B / C ↑ N

| Depth (inches) | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-0.5' | 0.0 | | | | Ground Cover |
| 0.5'-3' | 0.0 | | | | Moist lt brown fine sand |
| 3'-4.5' | 0.0 | | | | moist grayish brown fine sand. |
| 4.5'-6' | 0.0 | | | | Debris present (metal cable wire, |
| | | | | | drums, glass bottles) mixed w/ moist |
| | | | | | brown fine sand very loose material |
| 6'-13' | 0.0 | | | | moist grayish brown fine sand |
| 13'-15' | 7.1 | | | | moist-wet greenish dark gray |
| | | | | | fine silty sand. |
| 15' | | | | | Water Encountered, Strong odor |
| 15'-16' | | | | | wet olive dark gray fine silty |
| | | | | | Sand, Stained, Strong odor. Same material |
| | | | | | as observed @ top of water table in |
| | | | | | DPT borings to west across ~~street~~ 5/17/16 |
| | | | | | the road |
| | | | | | |

# TEST PIT LOG

| | |
|---|---|
| Project Name: | Project 15 CDL |
| Project Number: | |
| Project Manager: | |
| Location: | Wallops Island, VA |
| Test Pit ID: | TP-27A |
| Logged By: | S. Cleave |
| Contractor: | Eichelberger's - CDM Smith |
| Date Excavated: | 5/10/16 |
| Equipment Used: | Deere 160G |
| Total Depth: | 3' |
| Dimensions: | 3' x 10' |
| Water Table: | 3' |
| Ground Surface Elev.: | |

Remarks:

Northern 10' section → A, B, C

↑ N

| Depth ~~(inches)~~ ft. | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-0.5' | 0.0 | | | | Ground Cover / Topsoil |
| 0.5'-1' | 0.0 | | | | Moist-wet ~~fine~~ 5/10/16 lt brown fine sand |
| | | | | | Trace silt. |
| 1'-3' | 0.0 | | | | Moist-wet brown fine Sandy silt. |
| | | | | | w/ fill present. Debris consists of |
| | | | | | Springs(shocks), Pipes, glass, blue corroded material. |
| 3' | | | | | Water observed |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Sample

CDL-TP27A-00 1 004 @ 1.5' bgs

Duplicate CDL-TP27A-01-004

# TEST PIT LOG

Project Name: Project 15 CDL
Project Number:
Project Manager:
Location: Wallops Island, VA
Test Pit ID: TP-27B
Logged By: S. Cleaver
Contractor: CDM Smith

Date Excavated: 5/10/16
Equipment Used: Deere 160G
Total Depth: 3' bgs
Dimensions: 3' x 10'
Water Table: 3' bgs
Ground Surface Elev.:

Remarks:

Central 10' Section → A / B / C ↑ N

| Depth (inches) | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-0.5" | 0.0 | | | | Ground Cover / Topsoil |
| 0.5'-1' | 0.0 | | | | Moist-Wet lt brown fine ~~Sand~~ SC 5/10/16 |
| | | | | | ~~Trace silt.~~ Silty Sand. SC 5/10/16 |
| 1'-3' | 0.0 | | | | Moist-wet brown fine Sandy silt |
| | | | | | w/ Clay Debris present. ND |
| 3' | | | | | Water Observed |
| | | | | | |
| | | | | | |
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| | | | | | |

# TEST PIT LOG

Project Name: Project 15 COC
Project Number:
Project Manager:
Location: Wallops Island, VA
Test Pit ID: TP-27C
Logged By: S. Cleaver
Contractor: OBM Smith

Date Excavated: 5/10/16
Equipment Used: Deere 160 G
Total Depth: 4' bgs
Dimensions: 3'-10'
Water Table: 2'
Ground Surface Elev.:

Remarks:

Southern 10' Section → A / B / C ↑ N

| Depth ~~(inches)~~ ft. | Field Screening Result | Sample I.D. | Sample Interval | Geologic Unit | Material Description |
|---|---|---|---|---|---|
| 0'-0.5' | 0.0 | | | | Topsoil/Groundcover |
| 0.5'-1' | 0.0 | | | | Moist-wet lt ~~brown~~ get orange seepage fine silty Sand. |
| 1'-2' | 0.0 | | | | Moist-wet lt brown Sandy silt |
| 2' | | | | | Water slowly ~~coming~~ seeping in to trench (~~Fig Hole~~) |
| 2'-4' | 0.0 | | | | Moist-wet dark bluish gray clay. trace silt. Marsh material. |
| | | | | | |
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# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-1 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 2 | |
| Date Drilled: 7/21/15 | Boring Method/ Sample Method: DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 20'bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" ppm | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 4.5/5.0 | 0.0 | 0-1 dry lt brown fine sand/Topsoil<br>1-3.5 dry lt brown fine sand, well sorted | | |
| | | | 3.5'-4.5' dry brown fine sand, trace silt, well sorted. | | |
| 5 | 2.9/5 | 0.0 | 5'-5.8' dry lt brown fine sand, little debris | | |
| | | 3.6 | 5.8'-6.5' moist ~~olive gray~~ dark brown (staining) fine sand, loose density, well-sorted. | | |
| | | 32.7 | 6.5'-7.9' moist olive gray fine sand, well sorted. | | |
| | | 1.50 | | | |
| 10 | 3.4/5 | 1.8 | ~~10.4'~~ 10'-11.4' moist dark brown fine sand, well sorted. | | |
| | | 73.0 | | | |
| | | 601.9 | 11.4'-13.4' moist-wet dark olive gray fine sand, strong odor. | | |
| | | 242 | | | |
| | | 514 | | | |
| | | 343 | | | |
| | | | | | Soil<br>CDL-DPS01-00-27<br>@ 13'-13.5'bgs |
| | | | | | Water<br>CDL-DPW01-00-2939<br>@ 14.5-19.5'bgs |
| 15 | 5/5 | 13.9 | 15'-17' wet dark olive gray fine sand w/staining | | Water @ 15'bgs |
| | | 33.6 | | | |
| | | 867 | 17'-20' wet lt brown fine sand | | |
| | | 233 | | | |
| | | 14.2 | ~~18'-20' wet~~ SL 7/21/15 | | |
| 20 | | 5.1 | | | |
| | | 7.0 | | | |

Depth to Groundwater: 15'bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite Bentonite chips (Asphalt / Concrete)

# GEOPROBE Soil Boring Log

| Job Name | Boring No. ~~DPT-2~~ DPT-1 | Logged By |
|---|---|---|
| Job No. | Page 2 of 2 | |

| Date Drilled | Boring Method/ Sample Method | Geoprobe / Macrocore 4-ft 5-ft |
|---|---|---|
| Drilling Co. | Completion Depth | |
| Drill Foreman | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | ~~2.0~~ 2.6 | 2.6 | See prev. page for details | | |
| 20 | ~~2.0~~ 2.0 | 2.0 | End of Boring | | |

Depth to Groundwater: _____

Monitoring Well Installed? YES NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

**Backfill Type:** Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-2 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |
| Date Drilled: 7/22/15 | Boring Method/ Sample Method: DPT Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co.: Eichelbergers | Completion Depth: 15' bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 1.6/5 | 0.0 | 3.4'-5' ~~br~~ dry brown fill material, w/ fine sand. | | |
| 5 | 2.0/5 | 0.0 | 8'-8.4' moist dark brown fill (glass) with fine sand. | | Soil CDL-DPSO2-00-20 @ 9.5'-10' bgs |
| 10 | 4.6/5 | 0.0 | 11-11.5 moist-wet brown fill w/ sand & gravel<br>11.5-12.5 wet dark brown clayey silt, trace fine sand.<br>12.5-14.5 moist-wet olive brown silty clay, trace fine sand.<br>14.5'-15' wet grey fine silty sand. | | Water CDL-DPW02-00-2130 @ 10'-15' bgs. |
| 15 | | | End of Boring | | |

Depth to Groundwater: 11.5' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-3 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |
| Date Drilled: 7/22/15 | Boring Method/ Sample Method: DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 10' bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 2.1/5 | 0.0 | 0-0.5 Topsoil/Fill<br>0.5-2.1' dry lt brown fine sand, well sorted. | | |
| | | | ~~2.9-3.45~~ 7/22/15 | | |
| | | | | | Soil<br>CDL-DPS03-00-010<br>@ 4.5'-5' bgs |
| 5 | 4/5 | 0.0 | 6-7' moist-wet lt brown fine sand, well sorted. | | Water<br>CDL-DPW03-00-1120<br>@ 5'-10' bgs |
| | | 2917 | 7'-10' wet black stained fine sand, strong odor & sheen present. | | |
| | | 564 | | | |
| | | 427 | | | |
| | | 799 | | | |
| | | 158 | | | |
| | | 6.8 | | | |
| 10 | | 3.7 | | | |
| | | | End of Boring | | |

Depth to Groundwater: 7' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-4 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |
| Date Drilled: 7/23/15 | Boring Method/ Sample Method: DPT | Geoprobe / (Macrocore) 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 15' bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 2.0/5 | | | | |
| | | | 3'-5' dry lt brown fill waste (glass, scrap metal, blue corroded material) mixed w/ fine sand/topsoil | | |
| 5 | 3.0/5 | 0.0 | 7'-7.9' dry (mois) lt brown fill waste w/ fine sand mixed. | | Soil CDL-DPS04-00-015 @ 7-7.5' bgs |
| | | | 7.9'-10' wet lt brown fine sand. | | Water CDL-DPW04-00-19265 @ 9-14' bgs Duplicate Water CDL-DPW04-01-19265 |
| 10 | 5/5 | 0.0 | 10'-15' wet lt brown fine sand. | | |
| 15 | | | End of Boring | | |

Depth to Groundwater: 7.9' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-5 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 2 | |
| Date Drilled: 7/24/15 | Boring Method/ Sample Method: DPT | Geoprobe / Macrocore 4-ft 5-ft |
| Drilling Co.: Eichelberger's | Completion Depth: 20' bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 7.6/5 | 0.0 | 2.4"-3.4' Topsoil, lt grey | | |
| | | | 3.4'-5' dry-moist lt brown fine sand, well sorted. | | |
| 5 | 3.0/5 | 0.0 | 7'-10' moist lt brown (7/24/15) yellowish brown, fine sand, well sorted. | | |
| 10 | 3.5/5 | 0.0 | 11.5'-14' moist-lt brown fine sand, well sorted. | | Soil CDL-DPS05-00-026 @ 12.5'-13' bgs |
| | | 0.0 | | | |
| | | 0.0 | | | |
| | | 0.0 | | | |
| | | 0.0 | | | |
| | | 4.7 | 14'-15' wet lt-dark grey fine sand, strong odor + staining present. | | Water CDL-DPW05-00-2736 @ 13'-18' bgs |
| | | 1160 | | | |
| 15 | | 21.2 | | | |
| | 5.0/5 | 51.2 | 15'-16.5' wet lt brown fine sand, well sorted. | | |
| | | 2.40 | | | |
| | | 48.8 | 16.5'-20' wet dark grey fine sand, well sorted. | | |
| | | 5.0 | | | |
| | | 0.9 | | | |
| 18 | | 0.7 | | | |
| | | 0.0 | | | |

Depth to Groundwater: 14' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| Job Name | Boring No. DPT-5 | Logged By |
|---|---|---|
| Job No. | Page 2 of 2 | S. Cleaver |

| Date Drilled 7/24/15 | Boring Method/ Sample Method | Geoprobe / Macrocore 4-ft 5-ft |
|---|---|---|
| Drilling Co. | Completion Depth | |
| Drill Foreman | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | ~~100~~ | 0.0 | See prev page for details | | |
| 20 | | ↓ | End of Boring | | |

Depth to Groundwater: _____

Monitoring Well Installed? YES NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

**Backfill Type:** Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-6 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |

Date Drilled: 7/22/15 - 7/23/15
Drilling Co.: Eichelberger's
Drill Foreman: Chris Chronister
Boring Method/ Sample Method: DPT — Geoprobe / Macrocore 4-ft (5-ft)
Completion Depth: 15' bgs
Location: Wallops Island, VA

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 1.8/5 | 0.0 | 0-1.3' fill/waste<br>1.3-1.8' moist olive grey sandy silt, trace clay. | | |
| 5 | 4.5/5 | 0.0 | 5.5-7' moist-wet dark olive grey fine silty sand<br>7'-8.5' wet olive grey fine silty sand. well sorted.<br>8.5-10' wet olive gray fine sand, trace silt. well sorted. | | Soil<br>CDL-DPS06-00-014<br>@ 6.5'-7' bgs<br><br>Water<br>CDL-DPW06-00-1130<br>@ 5'-15' bgs |
| 10 | 2.5/5 | 0.0 | 11.5-13' moist lt brown clayey silt, trace sand.<br>13'-14' moist-wet dark olive grey fine sand, trace silt.<br>14-15 moist-wet olive grey fine sand. | | |
| 15 | | | End of Boring | | |

Depth to Groundwater: 7' bgs
Monitoring Well Installed? (YES) Temp NO
Monitoring Well ID:
Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-7 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |
| Date Drilled: 7/27/15 | Boring Method/ Sample Method: DPT Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co.: Eckelberger's | Completion Depth: 15' bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 1.8/5 | 0.0 | 0-1 SC Ground cover/fill waste<br>1'-1.8' moist - wet olive brown fine silty sand, plastic. | | Soil<br>CDL-DPS07-00-002<br>@ 0.5'-1' bgs |
| 5 | 4.2/5 | 0.0 | 5.8'-8.5' moist - wet olive grey clayey silt, with fine sand, plastic.<br>8.5'-10' moist dark brown fine sand/marsh mat w/ roots throughout. | | Water<br>CDL-DPW07-00-1130<br>from 5'-15' bgs |
| 10 | 2.3/5 | 0.0 | 12.7'-13.8' wet-moist dark brown fine silty sand.<br>13.8'-15' wet grey fine silty sand, plastic. | | |
| 15 | | | End of Boring | | |

Depth to Groundwater: ~5' bgs. Recent heavy rain, hard to accurately observe water in soil cores.

Backfill Type: Cuttings / Cuttings/Bentonite / Bentonite (circled) / Asphalt / Concrete

Monitoring Well Installed? (YES) Temp / NO

Monitoring Well ID:

Location surveyed? Yes / No — GPS Surveyor — Other

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-8 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |
| Date Drilled: 7/23/15 | Boring Method/ Sample Method: DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 15' bgs | |
| Drill Foreman: Chris Chromiak | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 2.7 / 5 | 0.0 | 2.3-3.3 ~~0-2.3 Topsoil/Fill~~ ~~2.7' moist~~ ~~2.3-5' moist brown fine silty sand w/ some fill present.~~ | | Soil CDL-DPS08-00-010 @ 4.5'-5' bgs CDL-DPS08-01-010 Duplicate of CDL-DPS08-00-010 for Dioxin/furan only |
| 5 | 4.0 / 5 | 0.0 | 6'-7' wet brown fill waste (burnt cinders) and fine silty sand. 7'-9.6' moist-wet olive brown clayey silt, trace fine sand. 9.6'-10' wet olive grey fine sand w/ organic material w/ lit. | | Water CDL-DPW08-00-1130 @ 5'-15' bgs Duplicate (Dioxins/furans) CDL-DPW08-01-1130 |
| 10 | 5 / 5 | 0.0 | 10'-12.8' wet olive grey fine silty sand, trace clay 12.8'-14' moist-wet olivegrey silty clay, soft. 14'-15' wet orangish brown fine sand, well sorted. | | |
| 15 | | | End of Boring | | |

Depth to Groundwater: 6' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-9 | Logged By SC Leaver |
| Job No. | Page 1 of 2 | |
| Date Drilled 7/24/15 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelberger's | Completion Depth 25' bgs | |
| Drill Foreman Chris Chronister | Location Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 3.2/5 | 0.0 | 1.8'- ~~5~~ dry lt brown to grey fine sand, well sorted. | | |
| 5 | 4.0/5 | 0.0 | ~~5.9~~ 6'- 7.1' moist lt brown fine sand, well sorted. | | |
| | | | 7.1'- 7.5' moist lt brown fine - med sand. | | |
| | | | 7.5'- 10' moist lt brownish grey fine sand, well sorted. | | |
| 10 | 4.0/5 | 0.0 | 11'- ~~12.3~~ 12' moist lt brown, fine sand, well sorted. | | |
| | | | 12'- 12.9' moist reddish brown fine med sand. | | |
| | | | 12.9'- 15' moist lt grey fine sand, well sorted | | |
| 15 | 4.0/5 | 0.0 | 16'- 17.7 moist lt brown fine sand | | Soil CDL-DP509-00-035 @ 17-17.5' bgs |
| | | | 17.7'- 20' wet lt grey fine - med sand. | | CDL-DP509-01-035 Duplicate of CDL-DP509-00-035 |
| 20 | | | | | |

Depth to Groundwater: 17.7' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name | Boring No. DPT-9 | Logged By S. Cleaver |
| Job No. | Page 2 of 2 | |
| Date Drilled 7/29/15 | Boring Method/ Sample Method Geoprobe / Macrocore 4-ft 5-ft | |
| Drilling Co. | Completion Depth | |
| Drill Foreman | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | | 0.0 | | | |
| 20 | | | 20'-22.3' wet lt brown fine-med sand. | | Water |
| | | | 22.3'-25' wet orangish reddish lt brown fine sand, orange color lenticular bedded throughout. | | CDL-DPW09-00-4150 @ 20'-25' bgs |
| 25 | | | End of boring | | |

Depth to Groundwater: _____

Monitoring Well Installed? YES NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

**Backfill Type:** Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-10 | Logged By S. Cleaver |
| Job No. | Page 1 of ___ | |
| Date Drilled 7/21/15 | Boring Method/ Sample Method DPT Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co. Eichelberger's | Completion Depth 15' bgs | |
| Drill Foreman Chris Chronister | Location Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 3.7 | 0.7 | 0-2' dry lt grey fine sand, well sorted | | |
| | 5.0 | 0.7 | | | |
| | | 0.5 | 2'-3.7' moist orangish yellow fine sand, well sorted. | | |
| | | 0.7 | | | |
| 5 | 3.4 | 0.0 | 6.6'-8' moist lt orangish brown fine sand well sorted. | | Soil CDL-DPS10-00-16, @ 7.5-8' 7/21/15 |
| | 5 | | 8'-10' wet lt brown fine sand well-sorted. | | |
| 10 | 5 | 0.0 | 10'-13.5' wet lt orangish brown fine sand, well sorted. | | Water CDL-DPW10-00-1726 @ 8'-13' bgs |
| | 5 | | 13.5'-14.5' wet lt grayish brown fine well sorted sand. | | |
| | | | 14.5'-15' wet lt gray clayey sand. | | |
| 15 | | | End of Boring | | |

Depth to Groundwater: 8'

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID: ___

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-11 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 1 | |
| Date Drilled: 7/27/15 | Boring Method/ Sample Method: DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 15' bgs | |
| Drill Foreman: Chris Chronister | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 4.0 / 5 | 0.0 | 0-0.5 Topsoil/Ground Cover<br>0.5'-2.2' dry orangish brown fine sand, well sorted<br>2.2-3.2 dry dark grayish black asphalt fill looking material mixed with lt brown fine sand.<br>3.2-9' moist grey fine sand, well sorted. | | |
| 5 | 3.5 / 5 | 0.0 | 6.5'-7.5' dry to moist olive grey fine sand.<br>7.5'-9.5' moist olive grey fine sand, well sorted<br>9.5'-10' moist-wet olive grey fine sand, well sorted. | | Soil<br>CDL-DPS11-00-019<br>@ 9'-9.5' bgs |
| 10 | 4.2 / 90 | 0.0 | 10.8'-12' moist-wet olive grey fine silty sand.<br>12'-13.3' wet dark olive grey fine silty sand.<br>13.3'-15' moist wet olive grey clayey silt and fine sand. Plastic. | | Water<br>CDL-DPS11-00-2130<br>from 10'-15' bgs |
| 15 | | | End of Boring | | |

Depth to Groundwater: 12' bgs

Monitoring Well Installed? (YES) Temp NO

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-12 | Logged By S. Cleaver |
| Job No. | Page 1 of 2 | |

Date Drilled 5/5/16
Drilling Co. Eagle Rangers
Drill Foreman Gary Garland

Boring Method/ Sample Method DPT Geoprobe / Macrocore 4-ft (5-ft)
Completion Depth 20'
Location Wallops Island, VA

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 3.2/5 | 0.0 | 0-0.2' Ground Cover<br>0.2'-1.3' moist brown Sandy Silt, Trace Clay<br>1.3'-3.2' moist lt brown Sandy silt, Trace Clay, Soft | | |
| 5 | 3.1/5 | 0.0 | 5'-6.5' moist lt brown silty clay, Soft.<br>6.5'-7' moist-lt brown sandy silt, med density<br>7'-8.1' moist lt brown fine Sand. Very Loose. | | |
| 10 | 3.4/5 | 0.0 | 10'-10.5' moist-wet lt brown fine Sand. Very loose Sand<br>10.5-13.4' wet brown fine sand, Trace med Sand very loose Sand. | | Water @ 10.5' bgs<br>water Sample<br>CDL-DPW12-00-2232<br>screen @ 11-16' bgs<br>VOCs, SVOCs, diss Metals |
| 15 | 5/5 | 0.0 | 15'-20' wet, lt brown fine sand, Trace med sand. Very loose sand. clayey silt gray stringer @ 19.5' bgs. | | |
| 18 | | | | | |

Depth to Groundwater: 10.5'
Monitoring Well Installed? (YES) NO Temp
Monitoring Well ID:
Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite Chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-12 | Logged By: S. Cleaver |
| Job No.: | Page 2 of 2 | |

| | |
|---|---|
| Date Drilled: 5/5/16 | Boring Method/ Sample Method: DPT — Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 20' bgs |
| Drill Foreman: Gary Garland | Location: Wallops Island, VA |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | | | See Previous Page for Lithology details | | |
| 20 | | | End of Boring @ 20' bgs | | |

Depth to Groundwater: 10.5' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite Chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-13 | Logged By S. Cleaver |
| Job No. | Page 1 of 2 | |
| Date Drilled 5/4/16 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelberger's | Completion Depth 25' bgs | |
| Drill Foreman Gary Garland | Location Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 3.1/5 | 0.0 | 0'-0.2' ground cover<br>0.2'-3.1' moist lt brown fine sand. very Loose | | |
| 5 | 3.5/5 | 0.0 | 5'-8.5' moist lt brownish gray fine sand very loose. | | |
| 10 | 3.9/5 | 0.0 | 10'-13.9' moist lt brown fine sand. very Loose. | | |
| 15 | 4.6/5 | 0.0 | 15'-16.3' moist lt brown fine sand | | |
| | | 0.0 | 16.3'-17' moist-wet dark brown fine sand. very loose | | |
| | | 1.7 | 17' Wet Dark gray (stained & sheen) fine sand. odor | | Water @ 17' bgs |
| 18 | | 674 | | | CDL-DPW13-00-3344 |
| | | 243 | | | |

Depth to Groundwater: 17'

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite Chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-13 | Logged By S. Cleaver |
| Job No. | Page 2 of 2 | |
| Date Drilled 5/4/16 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelberger's | Completion Depth 25' bgs | |
| Drill Foreman Gary Garland | Location Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| | | 1.7 | | | |
| 19 | | 0.1 | 19' - 19.6' wet brown fine sand. very Loose | | |
| 20 | 5/5 | 0.0 | 20 - 20.5 moist-wet lt brown fine sand very loose | | |
| | | 8.2 | 20.5' - 21.5' wet dark brown fine sand. very loose | | |
| | | 0.0 | 21.5 - 25' wet lt brownish gray fine sand, Trace med sand. Loose. | | |
| | | 0.0 | | | |
| | | 0.0 | | | |
| | | 0.0 | | | |
| 25 | | | End of Boring @ 25' bgs | | |

Depth to Groundwater: _____

Monitoring Well Installed? YES NO

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite Bentonite Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-14 | Logged By: S. Cleaver |
| Job No.: | Page: 1 of 2 | |

| | |
|---|---|
| Date Drilled: 5/5/16 | Boring Method/ Sample Method: DPT — Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 20' |
| Drill Foreman: Gary Garland | Location: Wallops Island, VA |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 2.9/5 | 0.0 | 0-0.5' moist brown fine sand. very loose<br>0.5'-2.9' moist lt brown fine sand. very loose. | | |
| 5 | 3.3/5 | 0.0 | 5'-7.4' moist-wet lt brown, fine sand, trace silt.<br>7.4'-8.3' moist-wet ltgrayishbrown fine sand. | | |
| 10 | 4.3/5 | 0.0<br>0.0<br>0.2<br>0.1<br>0.1<br>0.2<br>6.0<br>1627 | 10'-13.2' Same as above (7.4-8.3) but wet<br>13.2'-14.3' wet lt gray fine sand. staining strong odor, Native Sands, no fill observed | | Water @ 15' bgs<br>Water Sample<br>CDL-DPW14-00-3140<br>Duplicate<br>CDL-DPW14-01-3140<br>VOCs, SVOCs, diss Metals |
| 15 | 5/5 | 8.5<br>1.3<br>51.2<br>38.1<br>328<br>1600 | 15'-20' wet gray fine sand, staining, strong odor, Sheen present @ 16' bgs. | | |
| 18 | | | | | |

Depth to Groundwater: 15' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-14 | Logged By S. Cleaver |
| Job No. | Page 2 of 2 | |

Date Drilled 5/5/10
Drilling Co. Eichelberger's
Drill Foreman Gary Garland

Boring Method/ Sample Method DPT  Geoprobe / Macrocore  4-ft  (5-ft)
Completion Depth 20'
Location Wallops Island, VA

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | | 633<br>323<br>1000 | See Previous Page | | |
| 20 | | | End of Boring @ 20' bgs | | |

Depth to Groundwater: 11' bgs
Monitoring Well Installed? (YES) NO Temp
Monitoring Well ID:
Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings  Cuttings/Bentonite  (Bentonite chips)  Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT-15 | Logged By: S. Cleaver |
| Job No.: | Page 1 of 2 | |

Date Drilled: 5/5/16
Drilling Co.: Eichelberger's
Drill Foreman: Gary Garland

Boring Method/ Sample Method: DPT  Geoprobe / Macrocore  4-ft  (5-ft)
Completion Depth: 20'
Location: Wallops Island, VA

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 3.5/5 | 0.10 | 0-0.2' Ground Cover<br>0.2'-1.1' moist-dry lt brown silty clay. Soft clay<br>1.1-1.4 dry lt brown clayey silt, soft.<br>1.4'-2.2' moist lt brown silty fine sand very loose<br>2.2'-3.5' moist yel orange fine sand. very loose sand | | |
| 5 | 3.4/5 | 0.0 | 5'-6.7' moist yel orange fine sand. very loose sand<br>6.7'-8.4' moist-wet lt brown fine sand. very loose sand | | |
| 10 | 4.0/5 | 0.0 | 10'-11' Moist-wet lt brown fine sand very loose sand.<br>11'-13.5' moist-wet yel orange fine sand. very loose sand.<br>13.5'-14' moist to wet lt brown fine sand. very loose sand. | | |
| 15 | 3.3/5 | 0.0 | gc 5/5/16<br>~~15'-15.5'~~<br>15'-18.3' wet yel orange fine sand. very loose sand. | | Water @ 15' bgs<br>WATER Samp<br>CDL-DPW15-00-3140<br>VOCs, SVOCs, Diss Met, Dioxins<br>Screen @ 10'-15' bgs |
| 18 | | | | | |

Depth to Groundwater: 15' bgs
Monitoring Well Installed? (YES) NO Temp
Monitoring Well ID:
Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DPT-15 | Logged By S. Cleaver |
| Job No. | Page 2 of 2 | |
| Date Drilled 5/5/16 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelbergers | Completion Depth 20' | |
| Drill Foreman Gary Garland | Location Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | | | See prev. Page for lithology | | |
| 20 | | | End of boring @ 20' bgs | | |

Depth to Groundwater: 15' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL<br>Job No. | Boring No. DPT-16<br>Page 1 of 1 | Logged By: S. Cleaver |
| Date Drilled 5/4/16<br>Drilling Co. Eichelberger's<br>Drill Foreman Gary Garland | Boring Method/ Sample Method DPT Geoprobe / Macrocore 4-ft (5ft)<br>Completion Depth 15 'bgs<br>Location Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 3.1/5 | 0.0 | 0'-0.2' Ground Cover.<br>0.2'-1.6' moist lt brown fine Sand, Trace med Sand. Very loose sand.<br>1.6'-3.1' moist brown fine sand, Trace silt loose. | | |
| 5 | 2.8/5 | 0.0 | 5'-7.2' moist lt Brown fine Sand. Very Loose<br>7.2'-7.8' moist-wet lt brown fine Sand Very loose. | | |
| 10 | 5/5 | 0.0 | 10'-10.5' moist-wet lt brown fine sand very loose<br>10.5'-15' wet lt brown fine sand. very loose | | Water @ 10.5' bgs<br>Water Sample<br>CDL-DPTW16-00-2130<br>@ 10'-15' bgs |
| 15 | | | End of Boring @ 15' bgs | | |
| 18 | | | | | |

Depth to Groundwater: 10.5' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite Chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DPT17 | Logged By: S. Cleaver |
| Job No.: | Page 1 of 1 | |
| Date Drilled: 5/10/16 | Boring Method/ Sample Method: DPT | Geoprobe / Macrocore (4-ft) 5-ft |
| Drilling Co.: Eichelberger's | Completion Depth: 12' bgs | |
| Drill Foreman: R. Hoffman | Location: Wallops Island, VA | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | 1.8/4 | 0.0 | 0'-0.3' Ground Cover<br>0.3'-1.8' moist lt brown fine Sand. Very Loose Sand | | |
| 4 | 2.6/4 | 0.0 | 4'-5.1' moist lt brown fine Sand. Very Loose Sand.<br>5.1'-5.6' Moist dark brown fine Silty Sand. Med dense Sand<br>5.6'-5.9' Moist dark brown fine Sand, Trace Silt.<br>5.9'-6.6' moist lt brown fine Sand. Loose Sand. | | |
| 8 | 2.4/4 | 0.0 | 8'-9' Moist-Wet lt brown fine Sand.<br>9'-10.4' Wet lt brown fine Sand, Very loose Sand. | | Water @ 9' bgs<br>Water Sample<br>CDL-DPW17-00-1928<br>@ 9'-14' bgs |
| 12 | | | End of Boring @ 12' bgs | | |

Depth to Groundwater: 9' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite Chips) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15CDL | Boring No. DTW-1 | Logged By S. Cleaver |
| Job No. | Page 1 of 3 | |
| Date Drilled 8/18/16 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelberger's | Completion Depth 68' bgs | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 20 | 5.0 / 5.0 | 5.1<br>1.3<br>1.1<br>0.4<br>0.2<br>0.0 | 20'-20.3' wet lt gray fine sand. well sorted<br>20.3-20.9 wet lt gray clayey silt trace fine sand.<br>20.9-23.3 wet lt gray well sorted fine sand<br>23.3-23.6 moist lt gray soft plastic clay lens<br>23.6-25 wet yel orange fine-med sand | | |
| 25 | 0.0 / 5.0 | NA | Core Barrel crushed inside rod. When flushed out, material was lt gray fine sand. | | |
| 30 | 0.0 / 5.0 | NA | Core Barrel crushed inside rod. When flushed out, material was lt gray fine-coarse sand. | | |
| 35 | 0.0<br>0.0<br>0.2<br>0.0 / 5.0 | 0.1 | 35'-38.9' wet lt brown fine well sort sand<br>38.9'-40' moist - ~~wet~~ lt brown fine-med sand. | | |
| 38 | 3.4<br>0.4<br>0.3 | | | | |

Depth to Groundwater: NA

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15CDL | Boring No. DTW-1 | Logged By S. Cleaver |
| Job No. | Page 2 of 3 | |
| Date Drilled 8/18/16 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelbergers | Completion Depth 68' bgs | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 39 | 0.0 / 0.0 | | See previous page for details | | |
| 40 | 0.0 | 4.6 / 5.0 | 40-43.2 wet lt gray med sand<br>43.2-44.2 moist-wet lt grayish brown fine sand, trace med sand.<br>44.2-44.6 moist lt brownish yellowish orange well sorted fine silty sand. | | |
| 45 | 4.0 / 4.0 | 0.0 | 45-45.2 Same as above (44.2-44.6) sc 8/18/16<br>45.2-45.8 moist-wet lt gray ~~silty sand, (fine)~~ fine-med sand.<br>45.8-47 moist-wet lt gray fine silty sand well sorted.<br>47-47.6 moist-wet lt yellowish gray fine-med sand<br>47.6-49 lt brown fine-coarse sand and fine gravel. moist-wet poorly sorted. | | |
| 49 | 2.4 / 4.0 | 0.0 | 50.6-51.2 moist-wet lt gray med sand, trace fine gravel<br>51.2-53 wet lt gray well sorted fine sand, trace silt. | | |
| 53 | 3.3 / 4.0 | 0.0 | 53.7-55.1 wet lt grayish brown fine sand coarsening downward.<br>55.1-55.8 wet lt grayish brown fine-med sand, trace coarse sand.<br>55.8-57 wet lt brown fine sand. | | |
| 56 | | | | | |

Depth to Groundwater: NA

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No. DTW-1 | Logged By: S. Cleaver |
| Job No. | Page 3 of 3 | |
| Date Drilled 8/18/16 | Boring Method/ Sample Method DPT | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelbergers | Completion Depth 68'bgs | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| | 3.3/4.0 | 0.0 | see previous page for details | | |
| 57 | 3.0/3.0 | 0.0 | 57-59.1 wet lt gray med-coarse sand and fine-coarse gravel. Poor sort | | |
| | | | 59.1-60 wet lt brownish gray fine sand, trace fine gravel. | | GW Sample 59'-64'bgs |
| 60 | 4.0/4.0 | 0.0 | 60-61.4 moist-wet lt brown f-m Sand. | | CDL-DTW1-00-119128 |
| | | | 61.4-62.5 wet yel orange m-c sand, trace fine gravel. | | DUP CDL-DTW1-01-119128 |
| | | | 62.5-63.2 wet lt brown fine Sand, trace med sand. | | |
| | | | 63.2-63.9 wet lt brown med Sand and fine gravel. | | |
| | | | 63.9-64 moist lt brownish orange soft Clay. | | Top of Yorktown/lower Clay @ 63.9' |
| 64 | 4.0/4.0 | 0.0 | 64-68 moist-dry greenish gray clay, trace Silt. Fat clay. | | |
| 68 | | | End of Boring @ 68'bgs. | | |

Depth to Groundwater: NA

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DTW-2 | Logged By S. Barden |
| Job No. | Page 1 of 3 | |
| Date Drilled 8/22/16 - | Boring Method/ Sample Method DPT/HSA Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co. Eichelberger's | Completion Depth 60' | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" ppm | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 10 | 2.7/5 | 0.0 | 10-11.1 moist to wet lt gray fine silty sand, trace clay, soft | | 0'-10' No Sample (Previously Logged DPT-2) |
| | | | 11.1-12.1 Wet brownish gray f-m sand, trace silt | | |
| | | | 12.1-12.7 Wet gray fine sand | | Water @ 11.1' bgs |
| 15 | 5/5 | 0.0 | 15-18.8 wet lt gray f-m sand, med density. | | |
| | | | 18.8-20 wet lt gray m-c sand, med. density | | |
| 20 | 5/5 | 0.0 | 20-22.2 wet lt gray m-c sand, med. density. | | |
| | | | 22.2-24.5 moist & wet gray f-m Sand, med density | | |
| | | | 24.5-25 moist to dry lt gray fine Sand, trace rounded fine gravel, med-hard dense | | |
| 25 | 4.3/5 | 0.0 | 25-29.3 Wet lt gray med sand. Restricted Portions of m-c sand. hard density | | |
| 28 | | | | | |

Depth to Groundwater: 11.1' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DTW-2 | Logged By S. Barden |
| Job No. | Page 2 of 3 | |
| Date Drilled 8/22/16 | Boring Method/ Sample Method DPT/HSA Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co. Eichelberger's | Completion Depth 60' | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 29 | | | See previous page | | |
| 30 | 2.7/3 | 0.0 | 30-32.1 wet lt gray to orangish brown m-c Sand. 0.1' layer of fine rounded gravel @32'. | | |
| 33 | NA | | Flowing Sands, No sample core 33'-35' | | |
| 35 | 2.6/3 | 0.0 | 35-37.6 wet lt gray m-c sand | | |
| 38 | NA | | Flowing Sands, No Sample 38'-41' | | |
| 41 | 2.7/3 | 0.0 | 41-43.4 wet lt grayish brown m-c sand, trace fine gravel | | |
| | | | 43.4-43.7 wet lt gray fine Sand. | | |
| 44 | 2.1/5 | 0.0 | 44-46.1 wet lt gray med sand. | | |
| 46 | | | | | |

Depth to Groundwater: 11.1' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)

Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No. DTW-2 | Logged By: S. Barden |
| Job No. | Page 3 of 3 | |
| Date Drilled 8/22/16 - 8/25/16 | Boring Method/ Sample Method DPT/HSA Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co. Eichelberger's | Completion Depth 60' | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" ppm | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 47 | | | See Previous Page | | |
| 49 | | | No Sample 49-50' | | |
| 50 | | | | | |
| | 0.0/5 | | No Sample 50-55' | | GW Sample 53'-58' bgs CDL-DTW2-00-107116 (MS/MSD) |
| | | | Crushed Macro-Core Liner | | |
| 55 | | | | | |
| | 5/5 | 0.0 | 55-58.6 wet orangish brown med Sand. | | |
| | | | 58.6-59.2 wet-moist yel orange to tan Silty Clay. | | Yorktown @ 58.6' bgs |
| | | | 59.2-60 moist greenish olive gray clay, trace silt. | | |
| 60 | | | End of Boring @ 60' bgs | | |

Depth to Groundwater: 11.1' bgs

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No. DTW-3 | Logged By: S. Barden |
| Job No. | Page 1 of 3 | |
| Date Drilled 8/24/16 | Boring Method/ Sample Method APT/HSA Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co. Eichelberger's | Completion Depth 55' | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 10 | 4.5/5 | 0.0 | 10-13.2 wet lt gray med sand | | 0-10' previously logged (APT-B) |
| | | | 13.2-14.5 wet lt gray m-c sand. | | |
| 15 | 4.8/5 | 0.0 | 15-17.5 wet lt brown med sand, trace coarse sand. | | |
| | | | 17.5-19.8 wet lt brown m-c sand, trace fine gravel | | |
| 20 | 5/5 | 0.0 | 20-23.6 Wet lt brown med sand | | |
| | | | 23.6-25 moist to wet lt gray med sand. | | |
| 25 | 5/5 | 0.0 | 25-28.2 wet lt grayish brown m-c sand | | |
| 28 | | | 28.2-29.2 wet lt brown med sand. | | |

Depth to Groundwater: NA

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DTW-3 | Logged By S. Barden |
| Job No. | Page 2 of 3 | |

| | |
|---|---|
| Date Drilled 8/24/16 | Boring Method/ Sample Method DPT/HSA Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co. Eichelberger's | Completion Depth 55' |
| Drill Foreman C. Chronister | Location |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 29 | 5/5 | 0.0 | 29.2-30 wet brown coarse Sand, some fine gravel | | |
| 30 | | | 30-35 moist-wet lt gray med Sand. Dense. | | |
| | 5/5 | 0.0 | | | |
| 35 | | | 35-38.4 wet lt gray m-c Sand | | |
| | 5/5 | 0.0 | | | |
| | | | 38.4-40 wet yel orange med Sand, with Coarse Sand. Dense. | | |
| 40 | | | 40-42.5 wet yel orange med Sand | | |
| | 5/5 | 0.0 | 42.5-43.2 wet lt gray clayey silt | | |
| | | | 43.2-45 wet yel orange m-c Sand | | |
| 45 | 3.2/5 | 0.0 | 45-46.3 wet lt gray med sand. | | |
| 46 | | | 46.3-48.2 wet lt. gray m-c Sand | | |

Depth to Groundwater: NA

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DTW-3 | Logged By: S. Barden |
| Job No.: | Page 3 of 3 | |

| | |
|---|---|
| Date Drilled: 8/24/16 | Boring Method/ Sample Method: DPT/HSA Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 55' |
| Drill Foreman: C. Chronister | Location: |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 47 | 3.2/5 | 0.0 | See previous Page | | GW Sample 48'-53' bgs CDL-DTW3-00-097106 |
| 50 | 5/5 | 0.0 | 50-53 wet lt brown m-c sand | | |
| | | | 53-53.7 moist orangish brown silty clay | | Yorktown @ 53' bgs |
| | | | 53.7-55 moist dark greenish gray silty Clay | | |
| 55 | | | End of Boring @ 55' bgs | | |

Depth to Groundwater: NA

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DTW-4 | Logged By: S.Cleaver |
| Job No.: | Page: 1 of 4 | |
| Date Drilled: 8/15/16-8/17/16 | Boring Method/ Sample Method: DPT/Auger Seal | Geoprobe / Macrocore 4-ft (5-ft) |
| Drilling Co.: Eichelberger's | Completion Depth: 60' bgs | |
| Drill Foreman: C. Chronister | Location: | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" ppm | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 0 | | | 0-0.3 Ground Cover | | |
| 1 | 4.3/5 | 0.0 | 0.3-2' Dry grayish tan fine Sand, med-hard | | |
| | | | 2'-2.8' Dry lt brown Fine Sand, trace Silt. Med density | | |
| | | | 2.8'-3.5' moist lt brown Fine Sand. | | |
| | | | 3.5'-4.3' moist lt gray fine Sand. | | |
| 5 | 3.4/5 | 0.0 | 5'-5.9' Same as above (3.5'-4.3') | | |
| | | | 5.9'-7.3' moist lt brown fine Sand, Loose | | |
| | | | 7.3'-8.4' moist lt brown soft fine silty sand. | | |
| 10 | 3.6/5 | 0.0 | 10'-10.3' moist Same as above (7.3-8.4) | | Water @ 10.3' bgs |
| | | | 10.3'-11.9' Wet lt brown Loose fine Sand. | | |
| | | | 11.9'-13.6' Wet yel orange Loose fine sand. | | |
| 15 | 4.6/5 | 0.0 | 15'-18' moist-wet lt brown loose fine Sand | | |
| 18 | | | 18'-19.6' wet lt gray fine Sand with silt. | | |

Depth to Groundwater: 10.3' bgs

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID:

Location surveyed? Yes No GPS Surveyor Other

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DTW-4 | Logged By S. Cleaver |
| Job No. | Page 2 of 4 | |
| Date Drilled 8/15/16 → 8/17/16 | Boring Method/ Sample Method DPT/HSA Geoprobe / Macrocore 4-ft (5-ft) | |
| Drilling Co. Eichelberger's | Completion Depth 60' bgs | |
| Drill Foreman C. Chronister | Location | |

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 19 | | | See previous page for details. | | |
| 20 | | | | | |
| | 5.0 / 5.0 | 0.0 | 20'-22' wet yel orange fine sand-Loose | | |
| | | | 22'-24.6' wet lt brown Loose fine sand Clayey silt ~~lense~~ stringers 23-23.2' | | |
| | | | 24.6'-25' wet - moist ~~olive~~ lt gray to ~~g~~greenish gray silty clay. | | |
| 25 | | | | | |
| Continue → 8/16/16 | 4.6 / 5.0 | 0.0 | 25'-28' moist olive gray soft clay, plastic | | Columbia Clay @ ~ 25' bgs |
| | | | 28'-28.3' moist olive gray silty clay, trace fine sand. | | |
| | | | 28.3'-29.6' moist olive gray soft clay, plastic. | | |
| 30 | 4.5 / 5.0 / 5.0 | 0.0 | 30'-34.5' moist olive gray soft plastic clay | | Set auger seal down to 30' bgs. |
| 35 | | | | | |
| 36 | 5.0 / 5.0 | 0.0 | 35'-38.8' Same as above. | | |

Depth to Groundwater: 10.3' bgs

Monitoring Well Installed? (YES) NO Temp

Monitoring Well ID: _____

Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite) Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name Project 15 CDL | Boring No. DTW-4 | Logged By S. Cleaver |
| Job No. | Page 3 of 4 | |

Date Drilled 8/15/16 → 8/17/16
Drilling Co. Eichelbergers
Drill Foreman C. Chronister
Boring Method/ Sample Method DPT/HSA Geoprobe / Macrocore 4-ft (5-ft)
Completion Depth 60'
Location

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| 37 | 5.0 / 5.0 | 0.0 | olive dark gray<br>38.8'–39.6' moist-wet clayey silt, trace fine sand w/ some peat present | | |
| | | | 39.6'–40' moist-wet lt brown well sorted fine sand | | |
| 40 | | | sc 8/15/16<br>40–45' No Sample Core due to 40'–42' flowing Sands. | | |
| 42 | NA | NA | 42'–43.8' wet lt gray well sorted fine sand | | |
| | 5.0 / 5.0 | 0.0 | 43.8'–44.3' wet lt gray poorly sorted fine–coarse sand.<br>44.3'–45.6' wet lt gray poor sort fine–med sand, trace fine gravel. | | |
| 45 | | | 45.6–46 moist, sandy silt, trace clay. greenish gray | | |
| | | | 46–47' moist lt gray soft plastic clay. | | |
| 47 | | | 48.5'–49.8' moist lt gray soft plastic clay. | | |
| | 1.5 / 3.0 | 0.0 | 49.8'–50' moist yel orange well–poor sort fine sand, trace med sand + clay. | | |
| 50 | | | 50.5–51.3' moist yel orange fine–med sand. | | Set screen 50–55' bgs<br>GW Sample 50'–55' bgs<br>CDL-DTW4-00-101110 |
| | 2.0 / 2.5 | 0.0 | 51.3'–52.5' moist–wet med–coarse sand. | | |
| 52.5 | | | 52.8'–53.3' wet lt gray poor sort med–coarse sand. | | |
| | 2.2 / 2.5 | 0.0 / 2.2 | 53.3'–53.9' moist–wet lt gray silty clay and fine sand. | | |
| 54 | | | | | |

Depth to Groundwater: 10.3' bgs
Monitoring Well Installed? (YES) NO Temp
Monitoring Well ID: _____
Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)
Asphalt / Concrete

# GEOPROBE Soil Boring Log

| | | |
|---|---|---|
| Job Name: Project 15 CDL | Boring No.: DTW-4 | Logged By: S. Cleaver |
| Job No.: | Page 4 of 4 | |

Date Drilled: 8/15/16 → 8/17/16
Drilling Co.: Eichelberger's
Drill Foreman: C. Chronister
Boring Method/ Sample Method: DPT/HSA Geoprobe / Macrocore 4-ft (5-ft)
Completion Depth: 60' bgs
Location:

| Depth (Feet) | Recovery (% or inches) | PID every 6" | Visual Description | Sample No. | Comments |
|---|---|---|---|---|---|
| | | | 53.9'-55' wet lt gray fine-med sand trace fine gravel. | | |
| 8/17/16 → 55 | 2.5/2.5 | 0.0 | 55'-56.7' moist lt brown soft silty clay | | Yorktown @ 55' bgs |
| | | | 56.7'-57.5' moist soft greenish gray Silty Clay. | | |
| 57.5 | 2.5/2.5 | 0.0 | 57.5'-60' moist-dry greenish-olive gray silty clay. Med density | | Clay sc 8/17/16 ~~expand~~ being pulled in giving us 5' of recovery |
| 60 | | | End of Boring @ 60' bgs | | |

Depth to Groundwater: 10.3' bgs
Monitoring Well Installed? (YES) NO Temp
Monitoring Well ID:
Location surveyed? Yes No GPS Surveyor Other

Backfill Type: Cuttings Cuttings/Bentonite (Bentonite)
Asphalt / Concrete

# Appendix B

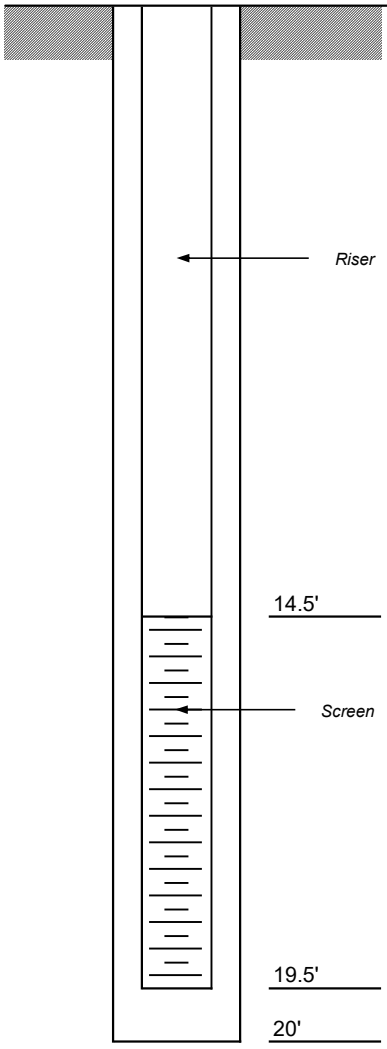
## Temporary Well Construction Diagrams

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-1

Surf elev.: 16.3'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 20' bgs | Depth To Water: | 15' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 14.5'-19.5' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

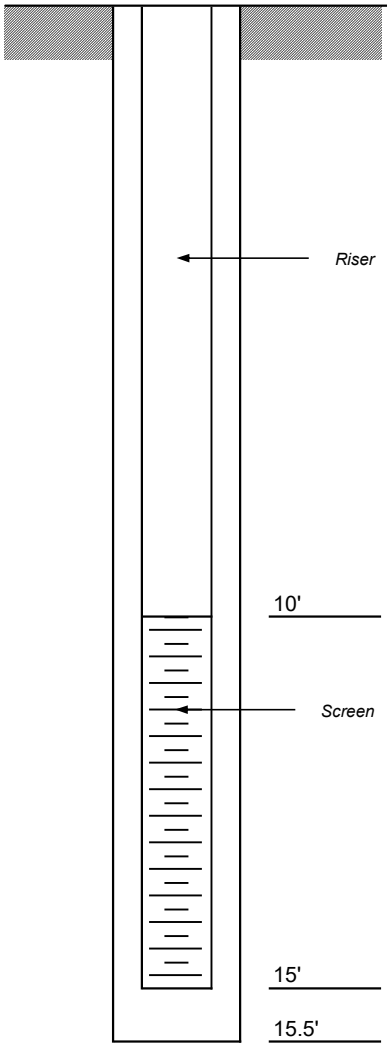
| | Started | Completed |
|---|---|---|
| Drilling: | 7/21/2015 | 7/21/2015 |
| Installation: | 7/21/2015 | 7/21/2015 |
| Abandonment: | 7/21/2015 | 7/21/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-2

Surf elev.: 10.0'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15.5' bgs | Depth To Water: | 11.5' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 10'-15' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

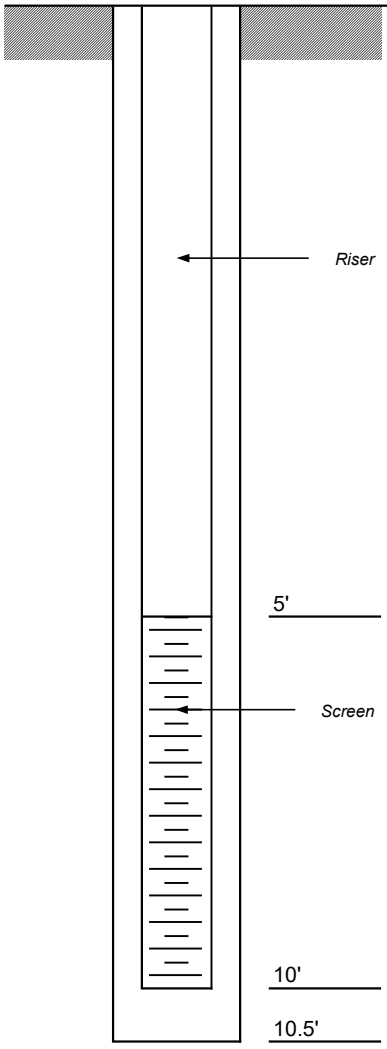
| | Started | Completed |
|---|---|---|
| Drilling: | 7/22/2015 | 7/22/2015 |
| Installation: | 7/22/2015 | 7/22/2015 |
| Abandonment: | 7/22/2015 | 7/22/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-3

Surf elev.: 8.6'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 10.5' bgs | Depth To Water: | 7' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 5'-10' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

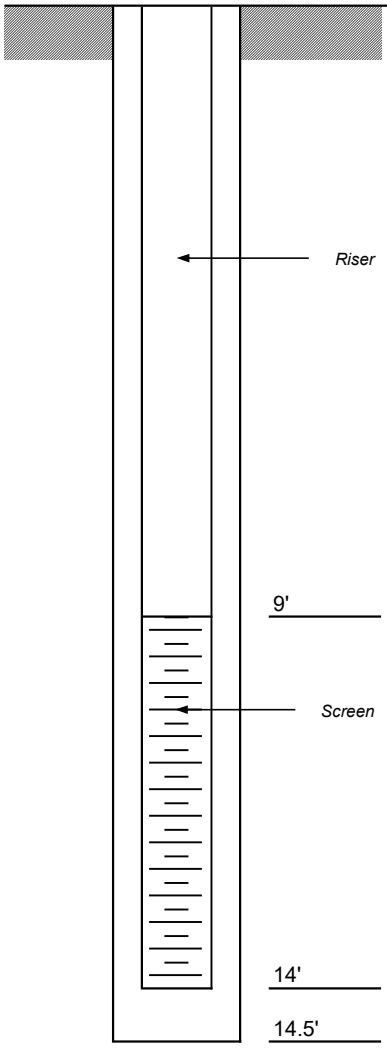
| | Started | Completed |
|---|---|---|
| Drilling: | 7/22/2015 | 7/22/2015 |
| Installation: | 7/22/2015 | 7/22/2015 |
| Abandonment: | 7/22/2015 | 7/22/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-4

Surf elev.: 9.1'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 14.5' bgs | Depth To Water: | 7.9' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 9'-14' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

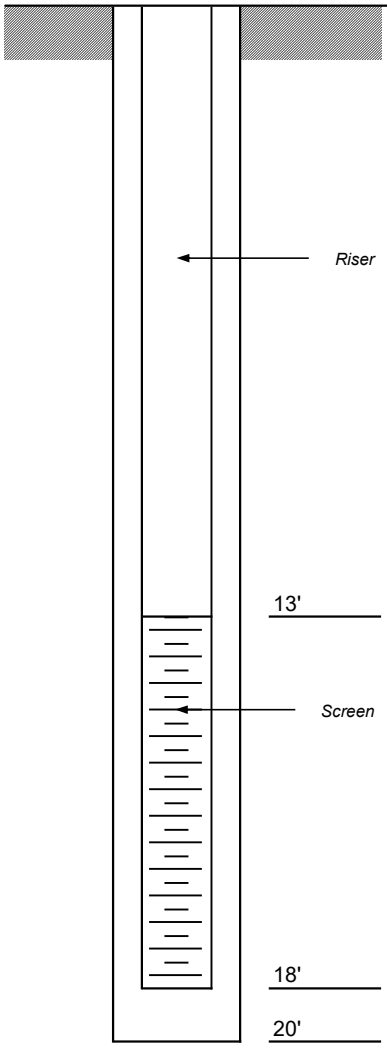
| | Started | Completed |
|---|---|---|
| Drilling: | 7/23/2015 | 7/23/2015 |
| Installation: | 7/23/2015 | 7/23/2015 |
| Abandonment: | 7/23/2015 | 7/23/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-5

Surf elev.: 14.6'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 20' bgs | Depth To Water: | 14' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 13'-18' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

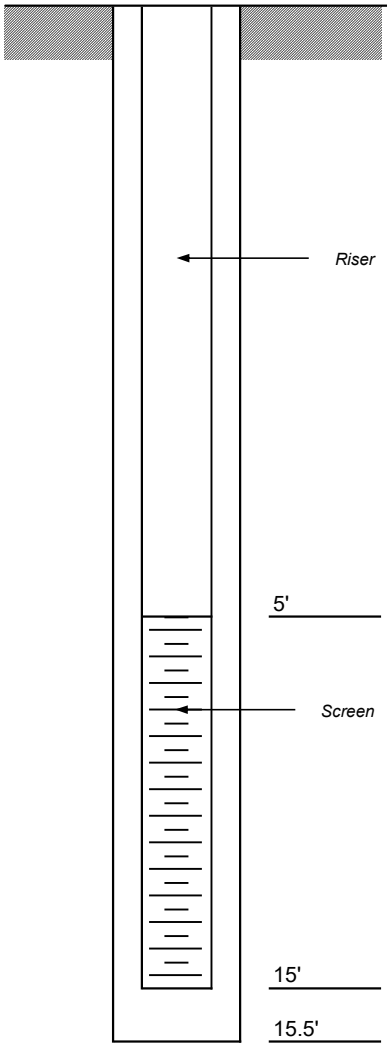
| | Started | Completed |
|---|---|---|
| Drilling: | 7/24/2015 | 7/24/2015 |
| Installation: | 7/24/2015 | 7/24/2015 |
| Abandonment: | 7/24/2015 | 7/24/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-6

Surf elev.: 6.0'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15.5' bgs | Depth To Water: | 7' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 5'-15' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

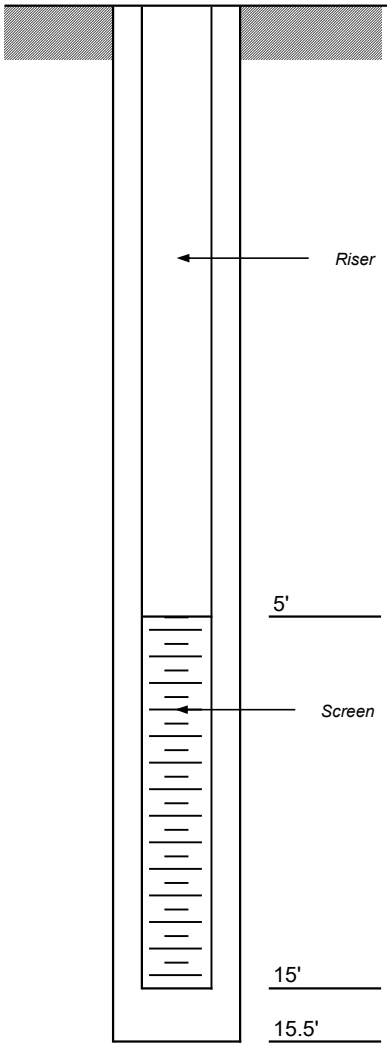
| | Started | Completed |
|---|---|---|
| Drilling: | 7/22/2015 | 7/23/2015 |
| Installation: | 7/23/2015 | 7/23/2015 |
| Abandonment: | 7/23/2015 | 7/23/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-7

Surf elev.: 2.9'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15.5' bgs | Depth To Water: | 1.10' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 5'-15' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

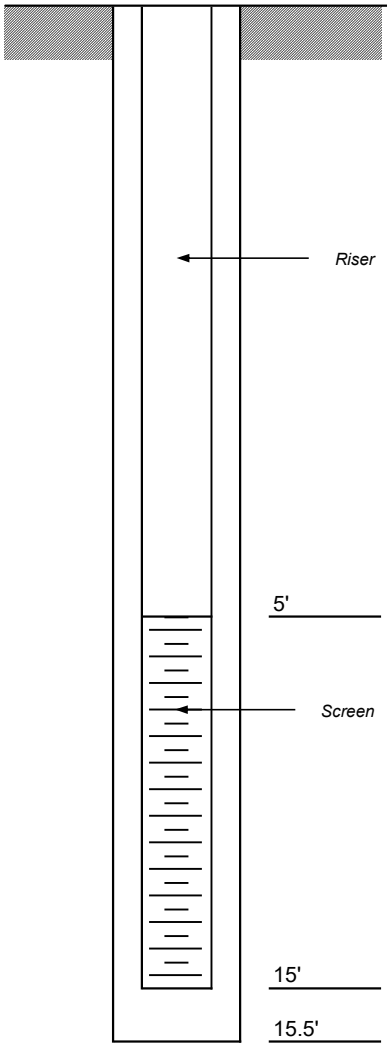
| | Started | Completed |
|---|---|---|
| Drilling: | 7/27/2015 | 7/27/2015 |
| Installation: | 7/27/2015 | 7/27/2015 |
| Abandonment: | 7/27/2015 | 7/27/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-8

Surf elev.: 4.1'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15.5' bgs | Depth To Water: | 6' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 5'-15' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

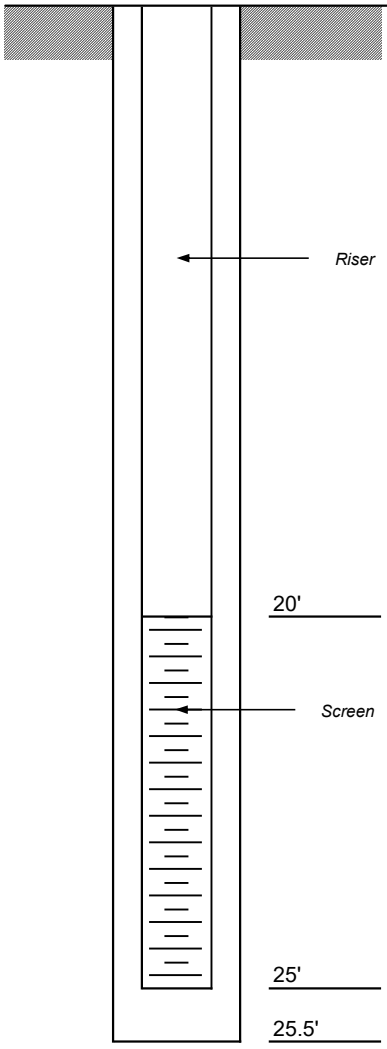
| | Started | Completed |
|---|---|---|
| Drilling: | 7/23/2015 | 7/23/2015 |
| Installation: | 7/23/2015 | 7/23/2015 |
| Abandonment: | 7/23/2015 | 7/23/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-9

Surf elev.: 19.3'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 25.5' bgs | Depth To Water: | 17.7' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 20'-25' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

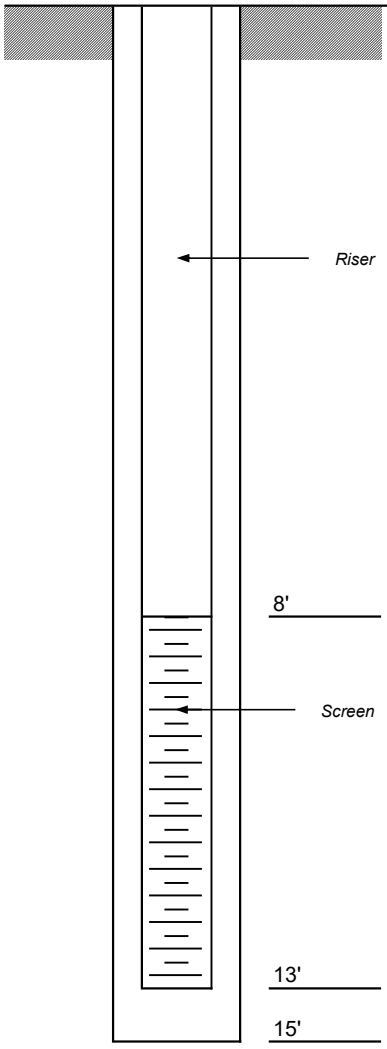
| | Started | Completed |
|---|---|---|
| Drilling: | 7/24/2015 | 7/24/2015 |
| Installation: | 7/24/2015 | 7/24/2015 |
| Abandonment: | 7/24/2015 | 7/24/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-10

Surf elev.: 10.2'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15' bgs | Depth To Water: | 8' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 8'-13' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

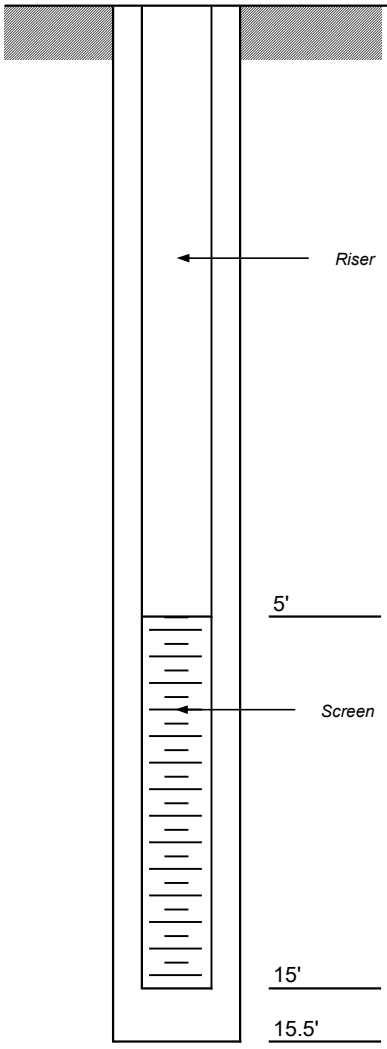
| | Started | Completed |
|---|---|---|
| Drilling: | 7/21/2015 | 7/21/2015 |
| Installation: | 7/21/2015 | 7/21/2015 |
| Abandonment: | 7/21/2015 | 7/21/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-11

Surf elev.: 12.0'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | C. Chronister |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15.5' bgs | Depth To Water: | 12' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 5'-15' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

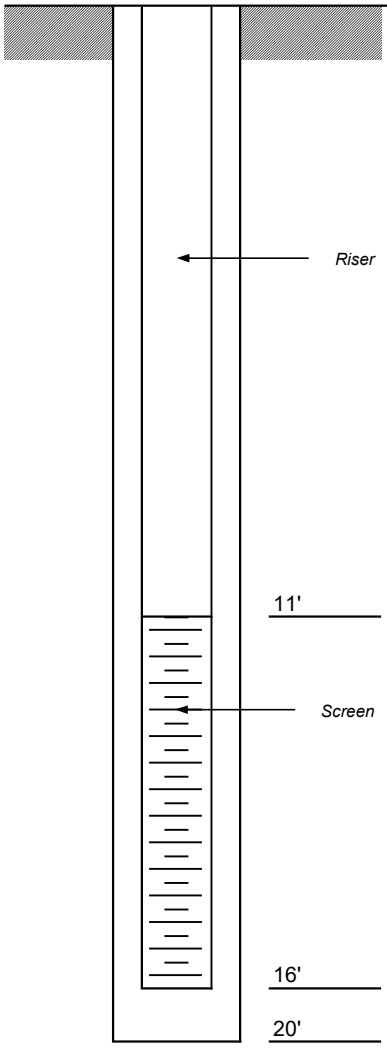
| | Started | Completed |
|---|---|---|
| Drilling: | 7/27/2015 | 7/27/2015 |
| Installation: | 7/27/2015 | 7/27/2015 |
| Abandonment: | 7/27/2015 | 7/27/2015 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-12

Surf elev.: 14.3'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 20' bgs | Depth To Water: | 10.5' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 11'-16' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

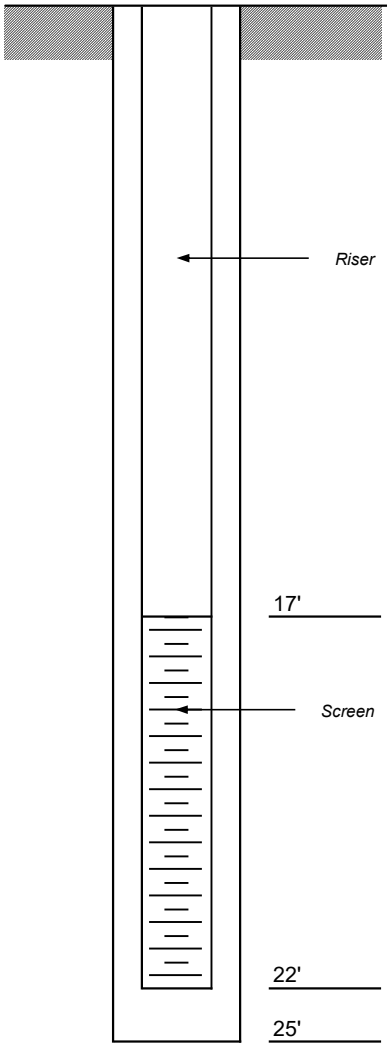
| | Started | Completed |
|---|---|---|
| Drilling: | 5/5/2016 | 5/5/2016 |
| Installation: | 5/5/2016 | 5/5/2016 |
| Abandonment: | 5/6/2016 | 5/6/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-13

Surf elev.: 19.8'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 25' bgs | Depth To Water: | 17' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 17'-22' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

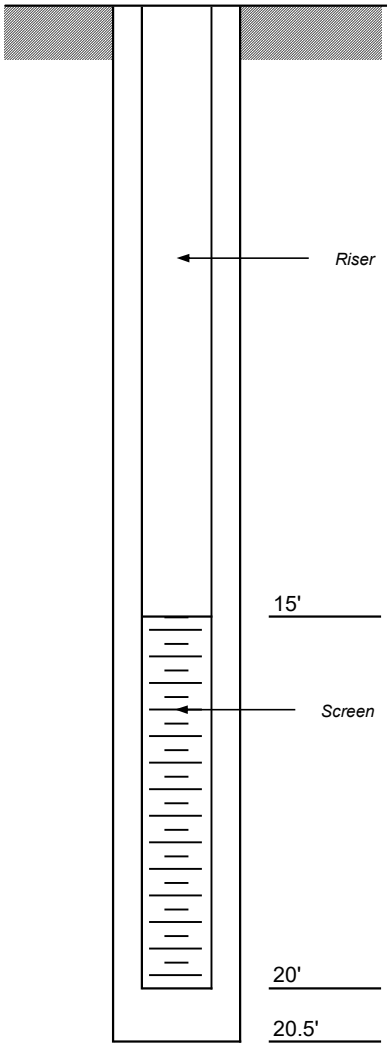
| | Started | Completed |
|---|---|---|
| Drilling: | 5/4/2016 | 5/4/2016 |
| Installation: | 5/4/2016 | 5/4/2016 |
| Abandonment: | 5/4/2016 | 5/4/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-14

Surf elev.: 16.1'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 20.5' bgs | Depth To Water: | 15' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 15'-20' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

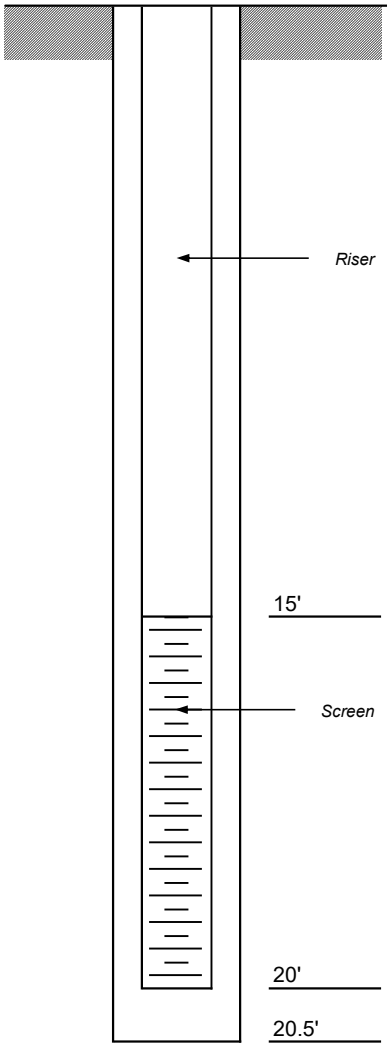
| | Started | Completed |
|---|---|---|
| Drilling: | 5/5/2016 | 5/5/2016 |
| Installation: | 5/5/2016 | 5/5/2016 |
| Abandonment: | 5/5/2016 | 5/5/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-15

Surf elev.: 19.3'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 20.5' bgs | Depth To Water: | 15' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 15'-20' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

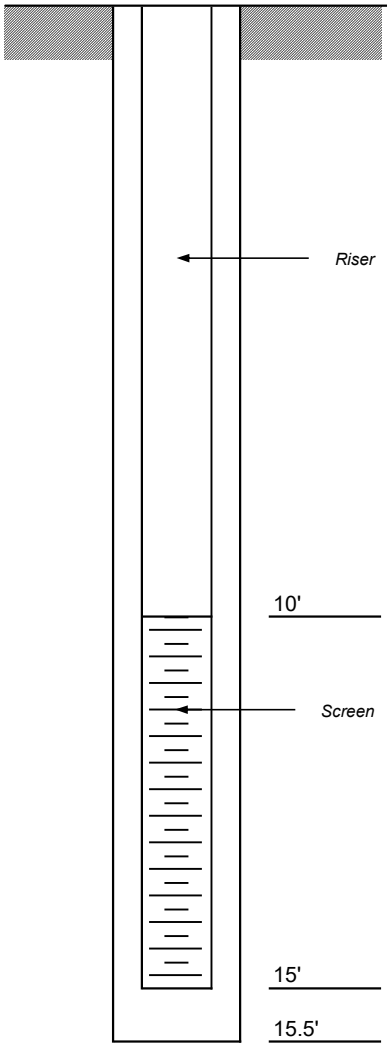
| | Started | Completed |
|---|---|---|
| Drilling: | 5/5/2016 | 5/5/2016 |
| Installation: | 5/5/2016 | 5/5/2016 |
| Abandonment: | 5/5/2016 | 5/5/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-16

Surf elev.: 13.0'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 15.5' bgs | Depth To Water: | 10.5' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 10'-15' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

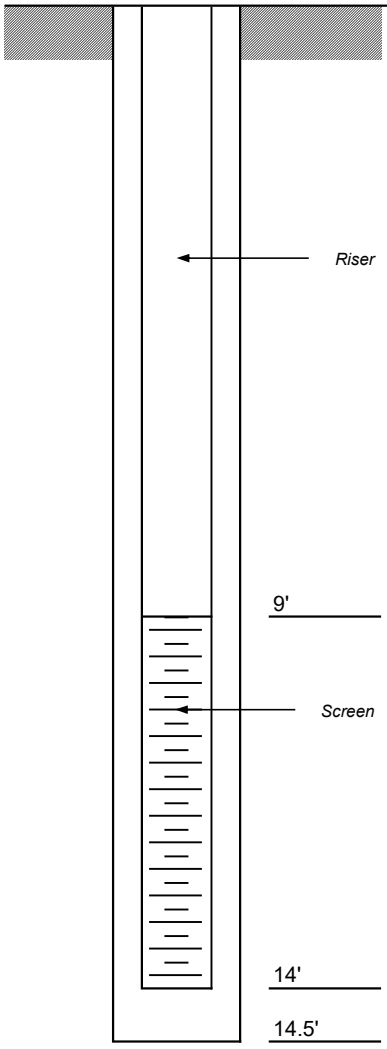
| | Started | Completed |
|---|---|---|
| Drilling: | 5/4/2016 | 5/4/2016 |
| Installation: | 5/4/2016 | 5/4/2016 |
| Abandonment: | 5/4/2016 | 5/4/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DPT-17

Surf elev.: 12.3'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 2" | | |
| Total Depth: | 14.5' bgs | Depth To Water: | 9' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 9'-14' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

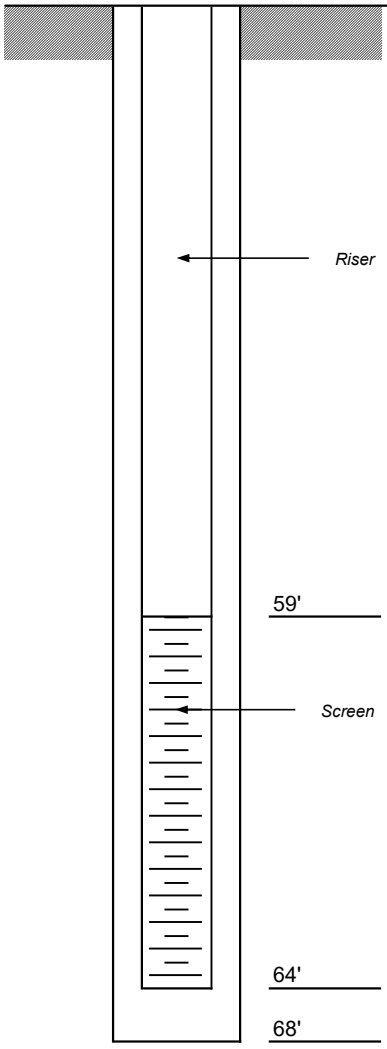
| | Started | Completed |
|---|---|---|
| Drilling: | 5/10/2016 | 5/10/2016 |
| Installation: | 5/10/2016 | 5/10/2016 |
| Abandonment: | 5/10/2016 | 5/10/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DTW-1

Surf elev.: 16.2'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 3" | | |
| Total Depth: | 68' bgs | Depth To Water: | 13.6' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 59'-64' bgs |
| Filter Material: | Geoprobe Pre-Pack | Setting: | 59'-64' bgs |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

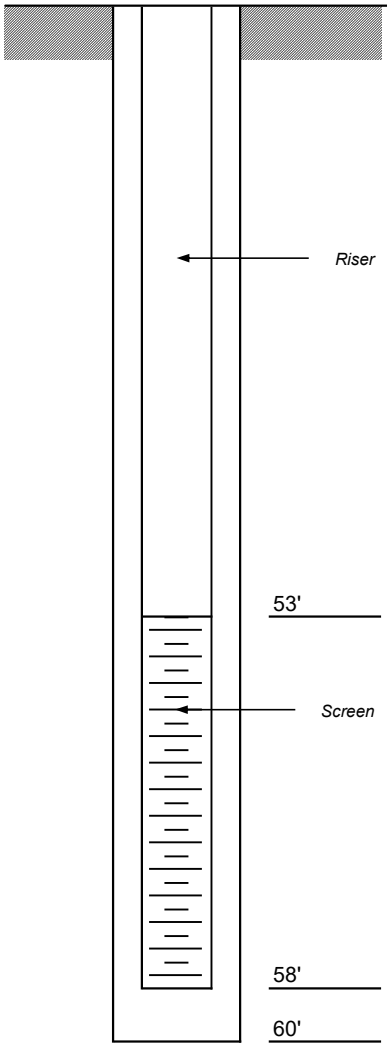
| | Started | Completed |
|---|---|---|
| Drilling: | 8/17/2016 | 8/18/2016 |
| Installation: | 8/18/2016 | 8/18/2016 |
| Abandonment: | 8/19/2016 | 8/19/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DTW-2

Surf elev.: 9.4'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 3" | | |
| Total Depth: | 60' bgs | Depth To Water: | 8.2' bgs |
| Supervisor Geologist: | S. Barden | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 53'-58' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

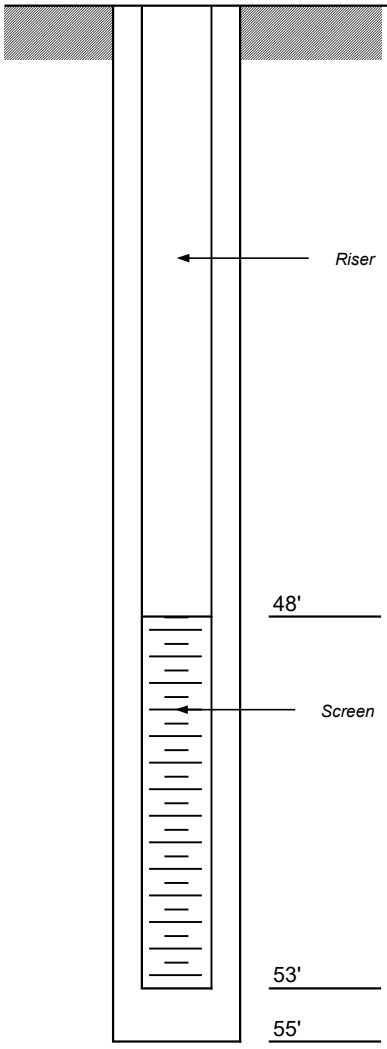
| | Started | Completed |
|---|---|---|
| Drilling: | 8/22/2016 | 8/23/2016 |
| Installation: | 8/23/2016 | 8/26/2016 |
| Abandonment: | 8/26/2016 | 8/26/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DTW-3

Surf elev.: 6.4'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 3" | | |
| Total Depth: | 55' bgs | Depth To Water: | 5.0' bgs |
| Supervisor Geologist: | S. Barden | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 48'-53' bgs |
| Filter Material: | NA | Setting: | NA |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

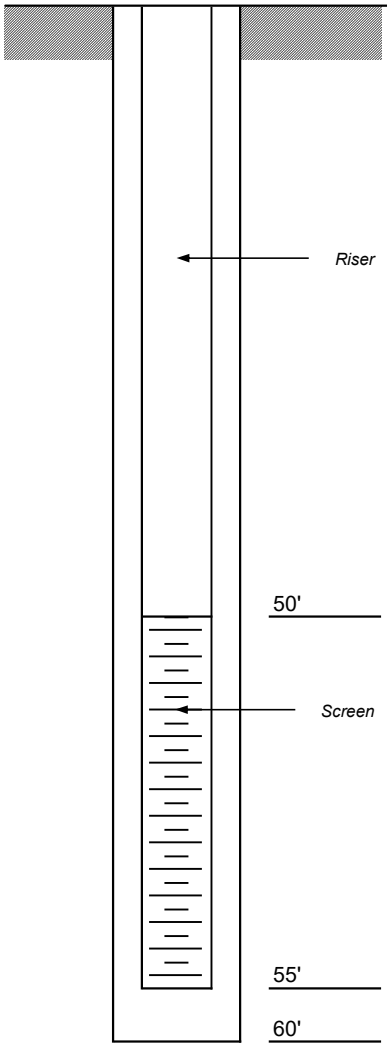
| | Started | Completed |
|---|---|---|
| Drilling: | 8/24/2016 | 8/25/2016 |
| Installation: | 8/25/2016 | 8/25/2016 |
| Abandonment: | 8/26/2016 | 8/26/2016 |

CDM Smith

**WELL CONSTRUCTION SUMMARY**

Project: Project 15 CDL  Location: Wallops Island, VA  Well No.: DTW-4

Surf elev.: 13.9'  Type: Temporary Well




## DRILLING SUMMARY

| | | | |
|---|---|---|---|
| Drilling Company: | Eichelberger's | Drillers: | G. Garland |
| Drill Rig/Model: | 6622 DT Geoprobe | | |
| Borehole Diameters: | 3" | | |
| Total Depth: | 60' bgs | Depth To Water: | 10.3' bgs |
| Supervisor Geologist: | S. Cleaver | | |

## WELL DESIGN

| | | | |
|---|---|---|---|
| Casing Material: | SCH-40 PVC | Diameter: | 1" |
| Screen Material: | SCH-40 PVC | Diameter: | 1" |
| Slot Size: | 0.010" | Setting: | 50'-55' bgs |
| Filter Material: | Geoprobe Pre-pack | Setting: | 50'-55' bgs |
| Seals Material: | NA | Setting: | NA |
| Grout: | NA | Setting: | NA |
| Surface Completion | Abandoned | | |

## TIME LOG

| | Started | Completed |
|---|---|---|
| Drilling: | 8/15/2016 | 8/17/2016 |
| Installation: | 8/17/2016 | 8/17/2016 |
| Abandonment: | 8/17/2016 | 8/17/2016 |

# Appendix C

## Supplemental Field Investigation Analytical Data

**Table C-1**
**Water Supply Well Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TOC-06 | TOC-06 | TOC-06 |
|---|---|---|---|---|
| Sample # | | CDL-PWTOC06-00-309450 | CDL-PWTOC06-01-309450 | CDL-PWTOC06-04-309450 |
| Sample Type | | N | FD | FD |
| Parent Sample # | | | CDL-PWTOC06-00-309450 | CDL-PWTOC06-00-309450 |
| Sample Date | | 11/14/2016 | 11/14/2016 | 11/14/2017 |
| Start Depth | | 154 | 154 | 154 |
| End Depth | | 225 | 225 | 225 |
| Depth Unit | | ft btic | ft btic | ft btic |
| Analyte | Units | | | |
| **Volatile Organic Compounds** | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 U | 0.8 U | NA |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 U | 0.8 U | NA |
| 1,1,2-Trichloroethane | µg/l | 0.8 U | 0.8 U | NA |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 U | 0.8 U | NA |
| 1,1-Dichloroethene | µg/l | 0.8 U | 0.8 U | NA |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 U | 0.8 U | NA |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 U | 0.8 U | NA |
| 1,2-Dibromoethane | µg/l | 0.8 U | 0.8 U | NA |
| 1,2-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | NA |
| 1,2-Dichloroethane | µg/l | 0.8 U | 0.8 U | NA |
| 1,2-Dichloropropane | µg/l | 0.8 U | 0.8 U | NA |
| 1,3-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | NA |
| 1,4-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | NA |
| 2-Butanone (MEK) | µg/l | 4 U | 4 U | NA |
| 2-Hexanone | µg/l | 4 U | 4 U | NA |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 U | 4 U | NA |
| Acetone | µg/l | 4 U | 4 U | NA |
| Benzene | µg/l | 0.8 U | 0.8 U | NA |
| Bromodichloromethane | µg/l | 0.8 U | 0.8 U | NA |
| Bromoform | µg/l | 0.8 U | 0.8 U | NA |
| Bromomethane | µg/l | 0.8 U | 0.8 U | NA |
| Carbon Disulfide | µg/l | 0.8 U | 0.8 U | NA |
| Carbon Tetrachloride | µg/l | 0.8 U | 0.8 U | NA |
| Chlorobenzene | µg/l | 0.8 U | 0.8 U | NA |
| Chloroethane | µg/l | 0.8 U | 0.8 U | NA |
| Chloroform | µg/l | 0.8 U | 0.8 U | NA |
| Chloromethane | µg/l | 0.8 U | 0.8 U | NA |
| cis-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | NA |
| cis-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | NA |
| Cyclohexane | µg/l | 0.8 U | 0.8 U | NA |
| Dibromochloromethane | µg/l | 0.8 U | 0.8 U | NA |
| Dichlorodifluoromethane | µg/l | 0.8 U | 0.8 U | NA |
| Ethylbenzene | µg/l | 0.8 U | 0.8 U | NA |
| Isopropylbenzene | µg/l | 0.8 U | 0.8 U | NA |
| Methyl Acetate | µg/l | 0.8 U | 0.8 U | NA |
| Methyl Tert-Butyl Ether | µg/l | 0.8 U | 0.8 U | NA |
| Methylcylohexane | µg/l | 0.8 U | 0.8 U | NA |
| Methylene Chloride | µg/l | 0.8 U | 0.8 U | NA |
| Styrene | µg/l | 0.8 U | 0.8 U | NA |
| Tetrachloroethene | µg/l | 0.8 U | 0.8 U | NA |
| Toluene | µg/l | 0.8 U | 0.8 U | NA |
| trans-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | NA |
| trans-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | NA |
| Trichloroethene | µg/l | 0.8 U | 0.8 U | NA |
| Trichlorofluoromethane | µg/l | 0.8 U | 0.8 U | NA |
| Vinyl Chloride | µg/l | 0.8 U | 0.8 U | NA |
| Xylenes (Total) | µg/l | 0.8 U | 0.8 U | NA |
| **Semi-Volatile Organic Compounds** | | | | |
| 1,1'-Biphenyl | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2,4,5-Trichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2,4,6-Trichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2,4-Dichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2,4-Dimethylphenol | µg/l | 0.8 U | 0.8 U | 0.8 U |
| 2,4-Dinitrophenol | µg/l | 3.2 U | 3.2 U | 3.2 U |
| 2,4-Dinitrotoluene | µg/l | 1 U | 1 U | 1 U |
| 2,6-Dinitrotoluene | µg/l | 1 U | 1 U | 1 U |
| 2-Chloronaphthalene | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2-Chlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2-Methylnaphthalene | µg/l | 0.1 U | 0.1 U | 0.1 U |
| 2-Methylphenol | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 2-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U |
| 2-Nitrophenol | µg/l | 0.8 U | 0.8 U | 0.8 U |
| 3,3'-Dichlorobenzidine | µg/l | 2 U | 2 U | 2 U |
| 3-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 U | 4 U | 4 U |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 U | 0.8 U | 0.8 U |
| 4-Chloroaniline | µg/l | 0.4 U | 0.4 U | 0.4 U |

**Table C-1**
**Water Supply Well Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TOC-06 | TOC-06 | TOC-06 |
|---|---|---|---|---|
| Sample # | | CDL-PWTOC06-00-309450 | CDL-PWTOC06-01-309450 | CDL-PWTOC06-04-309450 |
| Sample Type | | N | FD | FD |
| Parent Sample # | | | CDL-PWTOC06-00-309450 | CDL-PWTOC06-00-309450 |
| Sample Date | | 11/14/2016 | 11/14/2016 | 11/14/2017 |
| Start Depth | | 154 | 154 | 154 |
| End Depth | | 225 | 225 | 225 |
| Depth Unit | | ft btic | ft btic | ft btic |
| Analyte | Units | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 U | 0.4 U |
| 4-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U |
| 4-Nitrophenol | µg/l | 2 U | 2 U | 2 U |
| Acenaphthene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Acenaphthylene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Acetophenone | µg/l | 0.8 U | 0.8 U | 0.8 U |
| Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Atrazine | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Benzaldehyde | µg/l | 2 U | 2 U | 2 U |
| Benzo(a)Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Benzo(a)Pyrene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| Benzo(b)Fluoranthene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| Benzo(g,h,i)Perylene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| Benzo(k)Fluoranthene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| Benzyl Butyl Phthalate | µg/l | 4 U | 4 U | 4 U |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 U | 4 U | 4 UJ |
| Caprolactam | µg/l | 1.2 J | 4 U | 0.92 J |
| Carbazole | µg/l | 0.8 U | 0.8 U | 0.8 U |
| Chrysene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| m & p Cresol | µg/l | 2 U | 2 U | 2 U |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| Dibenzofuran | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Diethyl Phthalate | µg/l | 4 U | 4 U | 4 U |
| Dimethyl Phthalate | µg/l | 4 U | 4 U | 4 U |
| Di-N-Butylphthalate | µg/l | 4 U | 4 U | 4 U |
| Di-N-Octylphthalate | µg/l | 4 U | 4 U | 4 UJ |
| Fluoranthene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Fluorene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Hexachlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U |
| Hexachlorocyclopentadiene | µg/l | 3.2 U | 3.2 U | 3.2 U |
| Hexachloroethane | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 U | 0.16 U | 0.16 UJ |
| Isophorone | µg/l | 0.8 U | 0.8 U | 0.8 U |
| Naphthalene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Nitrobenzene | µg/l | 0.4 U | 0.4 U | 0.4 U |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 U | 0.8 U | 0.8 U |
| N-Nitrosodiphenylamine | µg/l | 0.92 U | 0.92 U | 0.92 U |
| Total High Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U |
| Pentachlorophenol | µg/l | 1.5 U | 1.5 U | 1.5 U |
| Phenanthrene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| Phenol | µg/l | 0.4 U | 0.4 U | 0.4 U |
| Pyrene | µg/l | 0.16 U | 0.16 U | 0.16 U |
| **Dioxins/Furans** | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,4,7,8-HXCDF | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,6,7,8-HXCDF | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,7,8,9-HXCDF | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 35.1 U | 34.8 U | NA |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 35.1 U | 34.8 U | NA |
| 2,3,4,6,7,8-HXCDF | pg/l | 35.1 U | 34.8 U | NA |
| 2,3,4,7,8-PECDF | pg/l | 35.1 U | 34.8 U | NA |
| 2,3,7,8-TCDD | pg/l | 6.99 UJ | 6.94 UJ | NA |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 6.99 UJ | 6.94 UJ | NA |
| OCDD | pg/l | 69.9 U | 69.4 U | NA |
| OCDF | pg/l | 69.9 U | 69.4 U | NA |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0 U | 0 U | NA |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 20 | 19.8 | NA |

**Table C-1**
**Water Supply Well Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TOC-06 | TOC-06 | TOC-06 |
|---|---|---|---|---|
| Sample # | | CDL-PWTOC06-00-309450 | CDL-PWTOC06-01-309450 | CDL-PWTOC06-04-309450 |
| Sample Type | | N | FD | FD |
| Parent Sample # | | | CDL-PWTOC06-00-309450 | CDL-PWTOC06-00-309450 |
| Sample Date | | 11/14/2016 | 11/14/2016 | 11/14/2017 |
| Start Depth | | 154 | 154 | 154 |
| End Depth | | 225 | 225 | 225 |
| Depth Unit | | ft btic | ft btic | ft btic |
| Analyte | Units | | | |
| **Inorganics** | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 0.2 U |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.008 U | 0.008 U | 0.008 U |
| Barium | mg/l | 0.013 U | 0.013 U | 0.013 U |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0025 U |
| Calcium | mg/l | 20 | 20 | 20 |
| Chromium | mg/l | 0.005 U | 0.005 U | 0.005 U |
| Cobalt | mg/l | 0.013 U | 0.013 U | 0.013 U |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U |
| Iron | mg/l | 0.41 | 0.39 | 0.41 |
| Lead | mg/l | 0.009 U | 0.009 U | 0.009 U |
| Magnesium | mg/l | 18 | 18 | 18 |
| Manganese | mg/l | 0.0069 J | 0.0068 J | 0.0069 J |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.008 U | 0.008 U |
| Potassium | mg/l | 19 | 19 | 19 |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 43 | 43 | 43 |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.025 U | 0.025 U |
| Zinc | mg/l | 0.01 U | 0.01 U | 0.01 U |

**Notes:**
FD = field duplicate
ft btic = feet below top of inner casing
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-2**
**Pore Water Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | PW11 | PW12 | PW13 | PW14 | PW14 | PW15 | PW16 | PW16 | PW17 | PW18 | PW18 | PW19 | PW20 | PW21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PW11-00-002 | CDL-PW12-00-002 | CDL-PW13-00-002 | CDL-PW14-00-002 | CDL-PW14-01-002 | CDL-PW15-00-002 | CDL-PW16-00-002 | CDL-PW16-01-002 | CDL-PW17-00-002 | CDL-PW18-00-002 | CDL-PW18-01-002 | CDL-PW19-00-002 | CDL-PW20-00-002 | CDL-PW21-00-002 |
| Sample Type | | N | N | N | N | FD | N | N | FD | N | N | FD | N | N | N |
| Parent Sample # | | | | | | CDL-PW14-00-002 | | | CDL-PW16-00-002 | | | CDL-PW18-00-002 | | | |
| Sample Date | | 8/25/2016 | 8/22/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/25/2016 | 8/26/2016 |
| Sample Depth | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichloroethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1-Dichloroethene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromoethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichlorobenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloroethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloropropane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,3-Dichlorobenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,4-Dichlorobenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 2-Butanone (MEK) | µg/l | 4 U | 20 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 2-Hexanone | µg/l | 4 U | 20 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 U | 20 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Acetone | µg/l | 4 U | 20 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Benzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromodichloromethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromoform | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromomethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Disulfide | µg/l | 0.8 U | 4 U | 0.8 U | 1.8 | 2 | 0.8 U | 0.8 U | 0.8 U | 3.9 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 23 |
| Carbon Tetrachloride | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chlorobenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroform | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloromethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,2-Dichloroethene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,3-Dichloropropene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Cyclohexane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dibromochloromethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dichlorodifluoromethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Ethylbenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Isopropylbenzene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Acetate | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Tert-Butyl Ether | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylcylohexane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylene Chloride | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Styrene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Tetrachloroethene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 5.3 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Toluene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,2-Dichloroethene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,3-Dichloropropene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichloroethene | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichlorofluoromethane | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Vinyl Chloride | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Xylenes (Total) | µg/l | 0.8 U | 4 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2,4,5-Trichlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2,4,6-Trichlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2,4-Dichlorophenol | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2,4-Dimethylphenol | µg/l | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| 2,4-Dinitrophenol | µg/l | 3.2 U | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.6 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ |

**Table C-2**
**Pore Water Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | PW11 | PW12 | PW13 | PW14 | PW14 | PW15 | PW16 | PW16 | PW17 | PW18 | PW18 | PW19 | PW20 | PW21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PW11-00-002 | CDL-PW12-00-002 | CDL-PW13-00-002 | CDL-PW14-00-002 | CDL-PW14-01-002 | CDL-PW15-00-002 | CDL-PW16-00-002 | CDL-PW16-01-002 | CDL-PW17-00-002 | CDL-PW18-00-002 | CDL-PW18-01-002 | CDL-PW19-00-002 | CDL-PW20-00-002 | CDL-PW21-00-002 |
| Sample Type | | N | N | N | N | FD | N | N | FD | N | N | FD | N | N | N |
| Parent Sample # | | | | | | CDL-PW14-00-002 | | | CDL-PW16-00-002 | | | CDL-PW18-00-002 | | | |
| Sample Date | | 8/25/2016 | 8/22/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/25/2016 | 8/26/2016 |
| Sample Depth | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| 2,4-Dinitrotoluene | µg/l | 1 U | 1 UJ | 1 UJ | 1 UJ | 1.1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ |
| 2,6-Dinitrotoluene | µg/l | 1 U | 1 UJ | 1 UJ | 1 UJ | 1.1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ | 1 UJ |
| 2-Chloronaphthalene | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2-Chlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2-Methylnaphthalene | µg/l | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.11 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ | 0.1 UJ |
| 2-Methylphenol | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 2-Nitroaniline | µg/l | 1.6 U | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.8 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ |
| 2-Nitrophenol | µg/l | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| 3,3'-Dichlorobenzidine | µg/l | 2 UJ | 2 R | 2 UJ | 2 UJ | 2.2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ |
| 3-Nitroaniline | µg/l | 1.6 U | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.8 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| 4-Chloroaniline | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| 4-Nitroaniline | µg/l | 1.6 U | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.8 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 UJ |
| 4-Nitrophenol | µg/l | 2 U | 2 UJ | 2 UJ | 2 UJ | 2.2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ |
| Acenaphthene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Acenaphthylene | µg/l | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Acetophenone | µg/l | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| Anthracene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Atrazine | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Benzaldehyde | µg/l | 2 U | 2 UJ | 2 UJ | 2 UJ | 2.2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ |
| Benzo(a)Anthracene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Benzo(a)Pyrene | µg/l | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Benzo(b)Fluoranthene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Benzo(g,h,i)Perylene | µg/l | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Benzo(k)Fluoranthene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Benzyl Butyl Phthalate | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 0.75 J | 0.73 J | 4 UJ | 4 UJ | 4 UJ |
| Caprolactam | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| Carbazole | µg/l | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| Chrysene | µg/l | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| m & p Cresol | µg/l | 2 U | 2 UJ | 2 UJ | 2 UJ | 2.2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Dibenzofuran | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Diethyl Phthalate | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| Dimethyl Phthalate | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| Di-N-Butylphthalate | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| Di-N-Octylphthalate | µg/l | 4 U | 4 UJ | 4 UJ | 4 UJ | 4.5 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ | 4 UJ |
| Fluoranthene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Fluorene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Hexachlorobenzene | µg/l | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| Hexachlorocyclopentadiene | µg/l | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.6 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ |
| Hexachloroethane | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Isophorone | µg/l | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| Naphthalene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Nitrobenzene | µg/l | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.88 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 UJ |
| N-Nitrosodiphenylamine | µg/l | 0.92 U | 0.92 UJ | 0.92 UJ | 0.92 UJ | 1 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ |

**Table C-2**
**Pore Water Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | PW11 | PW12 | PW13 | PW14 | PW14 | PW15 | PW16 | PW16 | PW17 | PW18 | PW18 | PW19 | PW20 | PW21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PW11-00-002 | CDL-PW12-00-002 | CDL-PW13-00-002 | CDL-PW14-00-002 | CDL-PW14-01-002 | CDL-PW15-00-002 | CDL-PW16-00-002 | CDL-PW16-01-002 | CDL-PW17-00-002 | CDL-PW18-00-002 | CDL-PW18-01-002 | CDL-PW19-00-002 | CDL-PW20-00-002 | CDL-PW21-00-002 |
| Sample Type | | N | N | N | N | FD | N | N | FD | N | N | FD | N | N | N |
| Parent Sample # | | | | | | CDL-PW14-00-002 | | | CDL-PW16-00-002 | | | CDL-PW18-00-002 | | | |
| Sample Date | | 8/25/2016 | 8/22/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/24/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/25/2016 | 8/26/2016 |
| Sample Depth | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| Total High Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Pentachlorophenol | µg/l | 1.5 U | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.7 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 UJ |
| Phenanthrene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| Phenol | µg/l | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.44 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ |
| Pyrene | µg/l | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.18 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ |
| **Dioxins/Furans** | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,4,7,8-HXCDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,6,7,8-HXCDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,7,8,9-HXCDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 2,3,4,6,7,8-HXCDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 2,3,4,7,8-PECDF | pg/l | 35.4 U | 33.5 U | 34 U | 33.7 U | 33.6 U | 37 U | 34.7 U | 33.5 U | 33.4 U | 37.6 U | 39.5 U | 34.1 U | 35.7 U | 35.1 U |
| 2,3,7,8-TCDD | pg/l | 7.07 U | 6.68 U | 6.77 U | 6.73 U | 6.7 U | 7.37 U | 6.92 U | 6.68 U | 6.66 U | 7.5 U | 7.87 U | 6.8 U | 7.11 U | 6.99 U |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 7.07 U | 6.68 U | 6.77 U | 6.73 U | 6.7 U | 7.37 U | 6.92 U | 6.68 U | 6.66 U | 7.5 U | 7.87 U | 6.8 U | 7.11 U | 6.99 U |
| OCDD | pg/l | 56.4 J | 66.8 U | 35 J | 44.9 J | 57.9 J | 73.7 U | 84.7 J | 105 | 66.6 U | 74.1 J | 78.7 U | 151 | 71.1 U | 69.9 U |
| OCDF | pg/l | 70.7 U | 66.8 U | 67.7 U | 67.3 U | 67 U | 73.7 U | 69.2 U | 66.8 U | 66.6 U | 75 U | 78.7 U | 68 U | 71.1 U | 69.9 U |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0.0169 | 0 U | 0.0105 | 0.0135 | 0.0174 | 0 U | 0.0254 | 0.0314 | 0 U | 0.0222 | 0 U | 0.0454 | 0 U | 0 U |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 20.2 | 19.1 | 19.3 | 19.2 | 19.1 | 21 | 19.8 | 19.1 | 19 | 21.4 | 22.5 | 19.4 | 20.3 | 20 |
| **Inorganics** | | | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.0034 J | 0.17 | 0.0097 J | 0.033 | 0.034 | 0.012 J | 0.0078 J | 0.011 J | 0.036 | 0.018 | 0.018 | 0.0063 J | 0.018 | 0.022 |
| Barium | mg/l | 0.013 U | 0.064 | 0.026 | 0.052 | 0.049 | 0.022 J | 0.015 J | 0.015 J | 0.039 | 0.024 J | 0.026 | 0.014 J | 0.077 | 0.025 |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0006 J | 0.0012 J | 0.0011 J | 0.0006 J | 0.0025 U | 0.0009 J | 0.0006 J | 0.0025 U | 0.0025 U | 0.0007 J | 0.0009 J | 0.0012 J |
| Calcium | mg/l | 35 | 400 | 320 | 360 | 330 | 350 | 320 | 330 | 290 | 330 | 340 | 340 | 300 | 360 |
| Chromium | mg/l | 0.005 U | 0.0072 J | 0.0014 J | 0.0024 J | 0.0017 J | 0.005 U | 0.005 U | 0.005 U | 0.0016 J | 0.0034 J | 0.0031 J | 0.005 U | 0.0014 J | 0.0012 J |
| Cobalt | mg/l | 0.013 U | 0.0022 J | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Iron | mg/l | 0.039 J | 0.17 | 0.18 | 0.08 U | 0.08 U | 0.051 J | 0.08 J | 0.071 J | 0.08 U | 0.043 J | 0.042 J | 0.11 | 0.08 U | 0.08 U |
| Lead | mg/l | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U |
| Magnesium | mg/l | 18 | 1300 | 1000 | 1100 | 1000 | 1100 | 1000 | 1000 | 900 | 1200 | 1200 | 1100 | 860 | 1100 |
| Manganese | mg/l | 0.0075 U | 0.15 | 0.14 | 0.075 | 0.069 J | 0.052 J | 0.048 J | 0.05 J | 0.05 J | 0.036 | 0.034 | 0.05 J | 0.095 | 0.13 |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 3E-05 J | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.008 U | 0.008 U | 0.0034 J | 0.008 U | 0.0031 J | 0.008 U | 0.0038 J | 0.008 U | 0.008 U | 0.008 U | 0.0033 J | 0.008 U | 0.008 U |
| Potassium | mg/l | 20 | 380 | 340 | 340 | 330 | 380 | 370 | 380 | 330 | 380 J | 500 | 390 | 310 | 400 |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 R | 0.017 R | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 UJ | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 94 | 10000 | 8700 | 8800 | 8800 | 9200 | 8600 | 9000 | 8000 | 7500 J | 22000 | 10000 | 8100 | 10000 |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.0038 J | 0.025 U | 0.0042 J | 0.0036 J | 0.025 U | 0.0029 J | 0.0027 J | 0.0034 J | 0.025 U | 0.025 U | 0.003 J | 0.025 U | 0.0034 J |
| Zinc | mg/l | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.0034 J | 0.013 J | 0.01 U | 0.01 U | 0.01 U |

**Notes:**
FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-3**
**Sediment Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD11 | SD12 | SD13 | SD14 | SD15 | SD16 | SD16 | SD17 | SD17 | SD18 | SD18 | SD19 | SD20 | SD21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD11-00-001 | CDL-SD12-00-001 | CDL-SD13-00-001 | CDL-SD14-00-001 | CDL-SD15-00-001 | CDL-SD16-00-001 | CDL-SD16-01-001 | CDL-SD17-00-001 | CDL-SD17-01-001 | CDL-SD18-00-001 | CDL-SD18-01-001 | CDL-SD19-00-001 | CDL-SD20-00-001 | CDL-SD21-00-001 |
| Sample Type | | N | N | N | N | N | N | FD | N | FD | N | FD | N | N | N |
| Parent Sample # | | | | | | | | CDL-SD16-00-001 | | CDL-SD17-00-001 | | CDL-SD18-00-001 | | | |
| Sample Date | | 8/22/2016 | 8/22/2016 | 8/23/2016 | 8/23/2016 | 8/23/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/22/2016 | 8/26/2016 |
| Start Depth | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| End Depth | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,1,2,2-Tetrachloroethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,1,2-Trichloroethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,1-Dichloroethene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,2,4-Trichlorobenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,2-Dibromoethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| 1,2-Dichlorobenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| 1,2-Dichloroethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,2-Dichloropropane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| 1,3-Dichlorobenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| 1,4-Dichlorobenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| 2-Butanone (MEK) | µg/kg | 57 J | 68 U | 69 J | 46 U | 40 J | 46 U | 35 J | 54 U | 25 J | 31 J | 35 J | 46 U | 25 J | 28 J |
| 2-Hexanone | µg/kg | 58 U | 68 U | 54 UJ | 46 U | 37 U | 46 U | 54 U | 54 U | 48 U | 43 U | 46 U | 46 U | 26 U | 50 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 58 U | 68 U | 54 UJ | 46 U | 37 U | 46 U | 54 U | 54 U | 48 U | 43 U | 46 U | 46 U | 26 U | 50 U |
| Acetone | µg/kg | 310 | 68 U | 330 J | 270 | 170 | 120 J | 160 J | 110 J | 120 | 120 | 160 | 44 U | 130 | 130 |
| Benzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Bromodichloromethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Bromoform | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Bromomethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 R | 26 U |
| Carbon Disulfide | µg/kg | 82 | 34 U | 34 J | 55 | 12 J | 72 | 54 | 37 | 26 J | 180 | 58 | 23 U | 77 | 74 |
| Carbon Tetrachloride | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 30 J |
| Chlorobenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Chloroethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Chloroform | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Chloromethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| cis-1,2-Dichloroethene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| cis-1,3-Dichloropropene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 UJ | 27 UJ | 27 U | 24 U | 22 U | 23 U | 23 U | 13 R | 26 U |
| Cyclohexane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Dibromochloromethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Dichlorodifluoromethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Ethylbenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Isopropylbenzene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Methyl Acetate | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Methyl Tert-Butyl Ether | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Methylcylohexane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Methylene Chloride | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Styrene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 R | 26 U |
| Tetrachloroethene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Toluene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| trans-1,2-Dichloroethene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| trans-1,3-Dichloropropene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 R | 26 U |
| Trichloroethene | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 UJ | 26 U |
| Trichlorofluoromethane | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Vinyl Chloride | µg/kg | 29 U | 34 U | 26 UJ | 22 U | 18 U | 23 U | 27 U | 27 U | 24 U | 22 U | 23 U | 23 U | 13 U | 26 U |
| Xylenes (Total) | µg/kg | 58 U | 69 U | 53 UJ | 45 U | 37 U | 46 U | 54 U | 54 U | 48 U | 43 U | 46 U | 46 U | 26 U | 51 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2,4,5-Trichlorophenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2,4,6-Trichlorophenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |

**Table C-3**
**Sediment Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD11 | SD12 | SD13 | SD14 | SD15 | SD16 | SD16 | SD17 | SD17 | SD18 | SD18 | SD19 | SD20 | SD21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD11-00-001 | CDL-SD12-00-001 | CDL-SD13-00-001 | CDL-SD14-00-001 | CDL-SD15-00-001 | CDL-SD16-00-001 | CDL-SD16-01-001 | CDL-SD17-00-001 | CDL-SD17-01-001 | CDL-SD18-00-001 | CDL-SD18-01-001 | CDL-SD19-00-001 | CDL-SD20-00-001 | CDL-SD21-00-001 |
| Sample Type | | N | N | N | N | N | N | FD | N | FD | N | FD | N | N | N |
| Parent Sample # | | | | | | | | CDL-SD16-00-001 | | CDL-SD17-00-001 | | CDL-SD18-00-001 | | | |
| Sample Date | | 8/22/2016 | 8/22/2016 | 8/23/2016 | 8/23/2016 | 8/23/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/22/2016 | 8/26/2016 |
| Start Depth | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| End Depth | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| 2,4-Dichlorophenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2,4-Dimethylphenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2,4-Dinitrophenol | µg/kg | 3500 U | 2800 U | 2800 U | 2500 U | 2000 U | 2400 U | 2400 U | 2400 U | 2600 U | 2300 U | 2400 U | 2400 U | 1500 U | 2700 U |
| 2,4-Dinitrotoluene | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2,6-Dinitrotoluene | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2-Chloronaphthalene | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2-Chlorophenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2-Methylnaphthalene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| 2-Methylphenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2-Nitroaniline | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 2-Nitrophenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 3,3'-Dichlorobenzidine | µg/kg | 860 U | 680 U | 700 U | 620 U | 500 U | 600 U | 600 U | 600 U | 640 U | 560 U | 580 U | 600 U | 380 U | 660 U |
| 3-Nitroaniline | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 3500 U | 2800 U | 2800 U | 2500 U | 2000 U | 2400 U | 2400 U | 2400 U | 2600 U | 2300 U | 2400 U | 2400 U | 1500 U | 2700 U |
| 4-Bromophenyl Phenyl Ether | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 4-Chloro-3-Methylphenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 4-Chloroaniline | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 4-Nitroaniline | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| 4-Nitrophenol | µg/kg | 3500 U | 2800 U | 2800 U | 2500 U | 2000 U | 2400 U | 2400 U | 2400 U | 2600 U | 2300 U | 2400 U | 2400 U | 1500 U | 2700 U |
| Acenaphthene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Acenaphthylene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Acetophenone | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Anthracene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Atrazine | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Benzaldehyde | µg/kg | 700 U | 550 U | 570 U | 500 U | 410 U | 490 U | 490 U | 490 U | 520 U | 460 U | 470 U | 490 U | 310 U | 540 U |
| Benzo(a)Anthracene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Benzo(a)Pyrene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Benzo(b)Fluoranthene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Benzo(g,h,i)Perylene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Benzo(k)Fluoranthene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Benzyl Butyl Phthalate | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Bis(2-Chloroethoxy)Methane | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Bis(2-Chloroethyl) Ether | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Caprolactam | µg/kg | 700 U | 550 U | 570 U | 500 U | 410 U | 490 U | 490 U | 490 U | 520 U | 460 U | 470 U | 490 U | 310 U | 540 U |
| Carbazole | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Chrysene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| m & p Cresol | µg/kg | 690 U | 560 U | 560 U | 500 U | 400 U | 480 U | 500 U | 480 U | 520 U | 460 U | 460 U | 480 U | 300 U | 540 U |
| Dibenzo(a,h)Anthracene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 UJ | 60 UJ | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Dibenzofuran | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Diethyl Phthalate | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Dimethyl Phthalate | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Di-N-Butylphthalate | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Di-N-Octylphthalate | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Fluoranthene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 17 J | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Fluorene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Hexachloro-1,3-Butadiene | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Hexachlorobenzene | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Hexachlorocyclopentadiene | µg/kg | 3500 U | 2800 U | 2800 U | 2500 U | 2000 U | 2400 R | 2400 R | 2400 U | 2600 U | 2300 U | 2400 U | 2400 U | 1500 UJ | 2700 U |
| Hexachloroethane | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 UJ | 490 UJ | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |

**Table C-3**
**Sediment Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD11 | SD12 | SD13 | SD14 | SD15 | SD16 | SD16 | SD17 | SD17 | SD18 | SD18 | SD19 | SD20 | SD21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD11-00-001 | CDL-SD12-00-001 | CDL-SD13-00-001 | CDL-SD14-00-001 | CDL-SD15-00-001 | CDL-SD16-00-001 | CDL-SD16-01-001 | CDL-SD17-00-001 | CDL-SD17-01-001 | CDL-SD18-00-001 | CDL-SD18-01-001 | CDL-SD19-00-001 | CDL-SD20-00-001 | CDL-SD21-00-001 |
| Sample Type | | N | N | N | N | N | N | FD | N | FD | N | FD | N | N | N |
| Parent Sample # | | | | | | | | CDL-SD16-00-001 | | CDL-SD17-00-001 | | CDL-SD18-00-001 | | | |
| Sample Date | | 8/22/2016 | 8/22/2016 | 8/23/2016 | 8/23/2016 | 8/23/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/22/2016 | 8/26/2016 |
| Start Depth | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| End Depth | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Isophorone | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Naphthalene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Nitrobenzene | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| N-Nitroso-Di-N-Propylamine | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| N-Nitrosodiphenylamine | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Total High Molecular Weight PAHs | µg/kg | 0 U | 0 U | 0 U | 0 U | 0 U | 17 | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/kg | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Pentachlorophenol | µg/kg | 1400 U | 1100 U | 1100 U | 1000 U | 810 U | 980 U | 980 U | 980 U | 1000 U | 910 U | 940 U | 980 U | 620 U | 1100 U |
| Phenanthrene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| Phenol | µg/kg | 700 U | 570 U | 570 U | 490 U | 400 U | 490 U | 490 U | 490 U | 530 U | 450 U | 450 U | 490 U | 300 U | 530 U |
| Pyrene | µg/kg | 85 U | 70 U | 70 U | 60 U | 49 U | 60 U | 60 U | 60 U | 65 U | 55 U | 55 U | 60 U | 37 U | 65 U |
| **Dioxins/Furans** | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | 15.9 | 6.73 J | 16.8 | 13.9 | 41.6 | 46.3 | 117 | 5.27 U | 2.75 J | 5.54 J | 16 | 41.5 | 9.31 | 58.7 |
| 1,2,3,4,6,7,8-HPCDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 3.54 J | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,4,7,8,9-HPCDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 3.13 J | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,4,7,8-HXCDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 5.38 J | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,6,7,8-HXCDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 2.6 J | 3.36 J | 8.17 | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 3.18 J | 3.23 U | 4.37 J |
| 1,2,3,7,8,9-HXCDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 2,3,4,6,7,8-HXCDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 2,3,4,7,8-PECDF | pg/g | 7.66 U | 5.35 U | 5.75 U | 4.92 U | 4.07 U | 4.22 U | 4.95 U | 5.27 U | 5.23 U | 4.29 U | 4.45 U | 4.79 U | 3.23 U | 5.71 U |
| 2,3,7,8-TCDD | pg/g | 1.53 U | 1.07 U | 1.15 U | 0.98 U | 0.811 U | 0.841 U | 0.987 U | 1.05 U | 1.04 U | 0.856 U | 0.887 U | 0.955 U | 0.644 U | 1.14 U |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | 0.996 J | 1.07 U | 1.15 U | 0.98 U | 0.655 J | 0.783 J | 1.47 J | 1.05 U | 1.04 U | 0.856 U | 0.479 J | 0.66 J | 0.644 U | 1.33 J |
| OCDD | pg/g | 313 | 122 | 271 | 258 | 777 | 804 | 2020 | 32.7 | 48.6 | 93.5 | 269 | 730 | 218 J | 1030 |
| OCDF | pg/g | 15.3 U | 10.7 U | 11.5 U | 9.8 U | 8.11 U | 8.41 U | 9.87 U | 10.5 U | 10.4 U | 8.56 U | 8.87 U | 9.55 U | 6.44 U | 11.4 U |
| Total TEQ (WHO 2005) ND = 0 | pg/g | 0.353 | 0.104 | 0.25 | 0.217 | 0.975 | 1.12 | 3.62 | 0.0098 | 0.042 | 0.0835 | 0.289 | 1.02 | 0.158 | 1.47 |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | 4.66 | 3.13 | 3.51 | 3 | 3.16 | 3.38 | 6.02 | 3.01 | 3.01 | 2.51 | 2.79 | 3.59 | 1.99 | 4.53 |
| **Inorganics** | | | | | | | | | | | | | | | |
| Aluminum | mg/kg | 16000 | 26000 | 18000 | 19000 | 15000 | 21000 | 22000 | 18000 | 21000 | 18000 | 20000 | 28000 | 13000 | 16000 |
| Antimony | mg/kg | 2 U | 2 R | 2.5 U | 1.9 U | 1.4 U | 2 U | 2.3 U | 2 U | 2.6 U | 1.5 R | 1.8 R | 2.3 R | 1.3 U | 2.8 U |
| Arsenic | mg/kg | 7 | 13 J | 7.8 | 8.1 | 6.1 | 8.5 | 8.5 | 7.4 | 9 | 7.6 J | 8.1 J | 20 J | 5.8 | 11 |
| Barium | mg/kg | 32 | 54 J | 39 | 40 | 33 | 47 | 48 | 39 | 44 | 40 J | 44 J | 62 J | 26 | 33 |
| Cadmium | mg/kg | 0.12 J | 0.27 UJ | 0.098 J | 0.19 J | 0.093 J | 0.3 J | 0.28 J | 0.25 J | 0.3 J | 0.16 J | 0.17 J | 0.3 UJ | 0.26 J | 0.15 J |
| Calcium | mg/kg | 3100 | 3200 J | 3000 | 3900 | 2000 | 2800 | 3000 | 2600 | 3000 | 2700 | 3400 | 4100 J | 2700 | 2500 |
| Chromium | mg/kg | 32 | 54 J | 37 | 40 | 31 | 45 | 49 | 38 | 46 | 37 J | 41 J | 59 J | 26 | 37 |
| Cobalt | mg/kg | 4.6 | 7.3 J | 4.6 | 5.6 | 4.4 | 6.3 | 7 | 5.3 | 6.5 | 5.4 J | 6 J | 7.7 J | 4.2 | 5.9 |
| Copper | mg/kg | 12 | 19 J | 14 | 15 | 11 | 18 | 18 | 14 | 17 | 14 J | 15 J | 18 | 11 | 15 |
| Iron | mg/kg | 17000 | 29000 | 17000 | 22000 | 16000 | 25000 | 27000 | 21000 | 26000 | 22000 | 25000 | 34000 | 17000 | 23000 |
| Lead | mg/kg | 16 | 21 J | 17 | 17 | 13 | 19 | 20 | 15 | 19 | 14 J | 16 J | 23 J | 13 | 18 |
| Magnesium | mg/kg | 8800 | 11000 J | 8400 | 8400 | 6000 | 8600 | 9100 | 7600 | 8800 | 8100 J | 9300 J | 13000 J | 5000 | 7300 |
| Manganese | mg/kg | 120 | 230 J | 130 | 170 | 120 | 200 | 220 | 170 | 200 | 170 | 190 | 290 J | 130 | 140 |
| Mercury | mg/kg | 0.21 U | 0.16 U | 0.16 U | 0.15 U | 0.11 U | 0.1 J | 0.12 J | 0.11 J | 0.11 J | 0.11 J | 0.1 J | 0.15 U | 0.085 U | 0.16 U |
| Nickel | mg/kg | 15 | 24 J | 15 | 18 | 14 | 20 | 22 | 17 | 21 | 17 J | 19 J | 26 J | 12 | 17 |
| Potassium | mg/kg | 4600 | 6200 | 5000 | 4900 | 3700 | 5200 | 5400 | 4500 | 5100 | 4600 J | 5100 J | 7100 J | 2900 | 4100 |
| Selenium | mg/kg | 2.2 U | 2.2 UJ | 2.6 U | 2 U | 1.5 U | 2.2 U | 2.5 U | 2.1 U | 2.8 U | 1.6 UJ | 1.9 UJ | 2.5 UJ | 1.4 U | 3 U |
| Silver | mg/kg | 0.65 U | 0.65 UJ | 0.8 U | 0.6 U | 0.47 U | 0.7 U | 0.8 U | 0.65 U | 0.85 U | 0.5 UJ | 0.6 UJ | 0.75 UJ | 0.42 U | 0.9 U |

**Table C-3**
**Sediment Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD11 | SD12 | SD13 | SD14 | SD15 | SD16 | SD16 | SD17 | SD17 | SD18 | SD18 | SD19 | SD20 | SD21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD11-00-001 | CDL-SD12-00-001 | CDL-SD13-00-001 | CDL-SD14-00-001 | CDL-SD15-00-001 | CDL-SD16-00-001 | CDL-SD16-01-001 | CDL-SD17-00-001 | CDL-SD17-01-001 | CDL-SD18-00-001 | CDL-SD18-01-001 | CDL-SD19-00-001 | CDL-SD20-00-001 | CDL-SD21-00-001 |
| Sample Type | | N | N | N | N | N | N | FD | N | FD | N | FD | N | N | N |
| Parent Sample # | | | | | | | | CDL-SD16-00-001 | | CDL-SD17-00-001 | | CDL-SD18-00-001 | | | |
| Sample Date | | 8/22/2016 | 8/22/2016 | 8/23/2016 | 8/23/2016 | 8/23/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/30/2016 | 8/29/2016 | 8/22/2016 | 8/26/2016 |
| Start Depth | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| End Depth | | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Inorganics Continued** | | | | | | | | | | | | | | | |
| Sodium | mg/kg | 39000 | 24000 | 31000 | 26000 | 13000 | 20000 | 21000 | 21000 | 23000 | 21000 J | 24000 J | 37000 | 10000 | 25000 |
| Thallium | mg/kg | 3.4 U | 3.4 UJ | 4.1 U | 3.1 U | 2.4 U | 3.4 U | 3.9 U | 3.3 U | 4.4 U | 2.5 UJ | 3 UJ | 3.8 UJ | 2.1 U | 4.6 U |
| Vanadium | mg/kg | 46 | 67 J | 50 | 51 | 38 | 50 | 54 | 42 | 50 | 42 J | 46 J | 77 J | 31 | 49 |
| Zinc | mg/kg | 54 | 85 J | 53 | 66 | 50 | 110 | 86 | 67 | 83 | 63 J | 71 J | 89 J | 53 | 68 |

**Notes:**
FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT1 | DPT10 | DPT11 | DPT2 | DPT3 | DPT4 | DPT5 | DPT5 | DPT6 | DPT7 | DPT8 | DPT8 | DPT9 | DPT9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS01-00-027 | CDL-DPS10-00-016 | CDL-DPS11-00-019 | CDL-DPS02-00-020 | CDL-DPS03-00-010 | CDL-DPS04-00-15 | CDL-DPS05-00-026 | CDL-DPS05-01-026 | CDL-DPS06-00-014 | CDL-DPS07-00-002 | CDL-DPS08-00-010 | CDL-DPS08-01-010 | CDL-DPS09-00-035 | CDL-DPS09-01-035 |
| Sample Type | | N | N | N | N | N | N | N | FD | N | N | N | FD | N | FD |
| Parent Sample # | | | | | | | | | CDL-DPS05-00-026 | | | | CDL-DPS08-00-010 | | CDL-DPS09-00-035 |
| Sample Date | | 7/21/2015 | 7/21/2015 | 7/27/2015 | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/24/2015 | 7/24/2015 | 7/22/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/24/2015 |
| Start Depth | | 13 | 7.5 | 9 | 9.5 | 4.5 | 7 | 12.5 | 12.5 | 6.5 | 0.5 | 4.5 | 4.5 | 17 | 17 |
| End Depth | | 13.5 | 8 | 9.5 | 10 | 5 | 7.5 | 13 | 13 | 7 | 1 | 5 | 5 | 17.5 | 17.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,1,2,2-Tetrachloroethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,1,2-Trichloroethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,1-Dichloroethene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,2,4-Trichlorobenzene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,2-Dibromoethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,2-Dichlorobenzene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,2-Dichloroethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,2-Dichloropropane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,3-Dichlorobenzene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 1,4-Dichlorobenzene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| 2-Butanone (MEK) | µg/kg | 8800 U | 8.8 UJ | 7.4 U | 11 J | 7.4 U | 9.6 U | 8.8 U | 8.8 U | 8.8 U | 9.6 U | 14 U | 7.9 J | 8.8 U | 8.8 U |
| 2-Hexanone | µg/kg | 8800 U | 8.8 UJ | 7.4 U | 10 UJ | 7.4 U | 9.6 U | 8.8 U | 8.8 U | 8.8 U | 9.6 U | 14 U | 12 U | 8.8 U | 8.8 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 8800 U | 8.8 UJ | 7.4 U | 10 UJ | 7.4 U | 9.6 U | 8.8 U | 8.8 U | 8.8 U | 9.6 U | 14 U | 12 U | 8.8 U | 8.8 U |
| Acetone | µg/kg | 9200 U | 8.4 UJ | 42 J | 10 UJ | 7.2 U | 9.6 U | 9.2 U | 8.8 U | 22 | 9.6 U | 25 J | 35 | 8.8 U | 8.8 U |
| Benzene | µg/kg | 3000 J | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Bromodichloromethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Bromoform | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Bromomethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Carbon Disulfide | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Carbon Tetrachloride | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Chlorobenzene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Chloroethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Chloroform | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Chloromethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| cis-1,2-Dichloroethene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| cis-1,3-Dichloropropene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Cyclohexane | µg/kg | 11000 | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Dibromochloromethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Dichlorodifluoromethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Ethylbenzene | µg/kg | 2400 J | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Isopropylbenzene | µg/kg | 4600 J | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Methyl Acetate | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Methyl Tert-Butyl Ether | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Methylcylohexane | µg/kg | 56000 | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Methylene Chloride | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 2.9 J | 2.6 J | 4.3 U | 4.5 U |
| Styrene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Tetrachloroethene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Toluene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 2.2 J | 1.9 J | 1.7 J | 4.3 U | 4.8 U | 7.3 U | 6 U | 1.7 J | 1.8 J |
| trans-1,2-Dichloroethene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| trans-1,3-Dichloropropene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Trichloroethene | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Trichlorofluoromethane | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Vinyl Chloride | µg/kg | 4600 U | 4.2 UJ | 3.7 U | 5 UJ | 3.7 U | 4.8 U | 4.6 U | 4.5 U | 4.3 U | 4.8 U | 7.3 U | 6 U | 4.3 U | 4.5 U |
| Xylenes (Total) | µg/kg | 25000 J | 8.5 UJ | 7.4 U | 10 UJ | 7.4 U | 9.6 U | 9.1 U | 9 U | 8.6 U | 9.6 U | 15 U | 12 U | 8.6 U | 9 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/kg | 2200 | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2,4,5-Trichlorophenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2,4,6-Trichlorophenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2,4-Dichlorophenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2,4-Dimethylphenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2,4-Dinitrophenol | µg/kg | 770 U | 770 U | 790 U | 890 U | 720 U | 780 U | 720 U | 720 U | 810 U | 890 U | 890 U | 890 U | 700 U | 700 U |
| 2,4-Dinitrotoluene | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT1 | DPT10 | DPT11 | DPT2 | DPT3 | DPT4 | DPT5 | DPT5 | DPT6 | DPT7 | DPT8 | DPT8 | DPT9 | DPT9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS01-00-027 | CDL-DPS10-00-016 | CDL-DPS11-00-019 | CDL-DPS02-00-020 | CDL-DPS03-00-010 | CDL-DPS04-00-15 | CDL-DPS05-00-026 | CDL-DPS05-01-026 | CDL-DPS06-00-014 | CDL-DPS07-00-002 | CDL-DPS08-00-010 | CDL-DPS08-01-010 | CDL-DPS09-00-035 | CDL-DPS09-01-035 |
| Sample Type | | N | N | N | N | N | N | N | FD | N | N | N | FD | N | FD |
| Parent Sample # | | | | | | | | | CDL-DPS05-00-026 | | | | CDL-DPS08-00-010 | | CDL-DPS09-00-035 |
| Sample Date | | 7/21/2015 | 7/21/2015 | 7/27/2015 | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/24/2015 | 7/24/2015 | 7/22/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/24/2015 |
| Start Depth | | 13 | 7.5 | 9 | 9.5 | 4.5 | 7 | 12.5 | 12.5 | 6.5 | 0.5 | 4.5 | 4.5 | 17 | 17 |
| End Depth | | 13.5 | 8 | 9.5 | 10 | 5 | 7.5 | 13 | 13 | 7 | 1 | 5 | 5 | 17.5 | 17.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2-Chloronaphthalene | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2-Chlorophenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2-Methylnaphthalene | µg/kg | 19000 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 24 J | 17 U | 17 U |
| 2-Methylphenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2-Nitroaniline | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 2-Nitrophenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 3,3'-Dichlorobenzidine | µg/kg | 190 U | 190 U | 190 U | 220 U | 180 U | 190 UJ | 180 UJ | 180 UJ | 200 U | 220 U | 220 U | 220 U | 170 UJ | 170 UJ |
| 3-Nitroaniline | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 770 U | 770 U | 790 U | 890 U | 720 U | 780 UJ | 720 UJ | 720 UJ | 810 U | 890 U | 890 U | 890 U | 700 UJ | 700 UJ |
| 4-Bromophenyl Phenyl Ether | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 4-Chloro-3-Methylphenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 4-Chloroaniline | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 4-Nitroaniline | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| 4-Nitrophenol | µg/kg | 770 U | 770 U | 790 U | 890 U | 720 U | 780 U | 720 U | 720 U | 810 U | 890 U | 890 U | 890 U | 700 U | 700 U |
| Acenaphthene | µg/kg | 2800 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Acenaphthylene | µg/kg | 19 U | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Acetophenone | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Anthracene | µg/kg | 1800 J | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Atrazine | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Benzaldehyde | µg/kg | 150 U | 150 U | 160 U | 180 U | 140 U | 160 U | 140 U | 140 U | 160 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Benzo(a)Anthracene | µg/kg | 850 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 38 J | 28 J | 22 U | 17 U | 17 U |
| Benzo(a)Pyrene | µg/kg | 670 J | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Benzo(b)Fluoranthene | µg/kg | 750 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Benzo(g,h,i)Perylene | µg/kg | 180 J | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 33 J | 22 U | 22 U | 17 U | 17 U |
| Benzo(k)Fluoranthene | µg/kg | 300 J | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Benzyl Butyl Phthalate | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Bis(2-Chloroethoxy)Methane | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Bis(2-Chloroethyl) Ether | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 190 J | 140 UJ | 140 UJ | 170 U | 130 J | 130 J | 180 U | 110 J | 110 J |
| Caprolactam | µg/kg | 150 U | 150 U | 160 U | 180 U | 140 U | 160 U | 140 U | 140 U | 160 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Carbazole | µg/kg | 520 | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Chrysene | µg/kg | 750 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 20 J | 14 J | 22 U | 17 U | 17 U |
| m & p Cresol | µg/kg | 150 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 150 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Dibenzo(a,h)Anthracene | µg/kg | 19 U | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Dibenzofuran | µg/kg | 2600 | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Diethyl Phthalate | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Dimethyl Phthalate | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Di-N-Butylphthalate | µg/kg | 690 | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Di-N-Octylphthalate | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Fluoranthene | µg/kg | 2800 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 27 J | 18 J | 22 U | 17 U | 17 U |
| Fluorene | µg/kg | 2800 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Hexachloro-1,3-Butadiene | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Hexachlorobenzene | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Hexachlorocyclopentadiene | µg/kg | 770 U | 770 U | 790 U | 890 U | 720 U | 780 U | 720 U | 720 U | 810 U | 890 U | 890 R | 890 R | 700 U | 700 U |
| Hexachloroethane | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 200 J | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Isophorone | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Naphthalene | µg/kg | 12000 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 22 U | 22 U | 17 U | 17 U |
| Nitrobenzene | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| N-Nitroso-Di-N-Propylamine | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| N-Nitrosodiphenylamine | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Total High Molecular Weight PAHs | µg/kg | 8800 | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 143 | 60 | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/kg | 25200 | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 26 | 29 | 0 U | 0 U |

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT1 | DPT10 | DPT11 | DPT2 | DPT3 | DPT4 | DPT5 | DPT5 | DPT6 | DPT7 | DPT8 | DPT8 | DPT9 | DPT9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS01-00-027 | CDL-DPS10-00-016 | CDL-DPS11-00-019 | CDL-DPS02-00-020 | CDL-DPS03-00-010 | CDL-DPS04-00-15 | CDL-DPS05-00-026 | CDL-DPS05-01-026 | CDL-DPS06-00-014 | CDL-DPS07-00-002 | CDL-DPS08-00-010 | CDL-DPS08-01-010 | CDL-DPS09-00-035 | CDL-DPS09-01-035 |
| Sample Type | | N | N | N | N | N | N | N | FD | N | N | N | FD | N | FD |
| Parent Sample # | | | | | | | | | CDL-DPS05-00-026 | | | | CDL-DPS08-00-010 | | CDL-DPS09-00-035 |
| Sample Date | | 7/21/2015 | 7/21/2015 | 7/27/2015 | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/24/2015 | 7/24/2015 | 7/22/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/24/2015 |
| Start Depth | | 13 | 7.5 | 9 | 9.5 | 4.5 | 7 | 12.5 | 12.5 | 6.5 | 0.5 | 4.5 | 4.5 | 17 | 17 |
| End Depth | | 13.5 | 8 | 9.5 | 10 | 5 | 7.5 | 13 | 13 | 7 | 1 | 5 | 5 | 17.5 | 17.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| Pentachlorophenol | µg/kg | 310 U | 310 U | 320 U | 360 U | 290 U | 310 U | 290 U | 290 U | 330 U | 360 U | 360 U | 360 U | 280 U | 280 U |
| Phenanthrene | µg/kg | 5800 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 22 U | 26 J | 29 J | 17 U | 17 U |
| Phenol | µg/kg | 160 U | 160 U | 160 U | 170 U | 140 U | 160 U | 140 U | 140 U | 170 U | 180 U | 180 U | 180 U | 140 U | 140 U |
| Pyrene | µg/kg | 2300 | 19 U | 19 U | 21 U | 18 U | 19 U | 18 U | 18 U | 21 U | 25 J | 22 U | 22 U | 17 U | 17 U |
| **Dioxins/Furans** | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,6,7,8-HPCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8,9-HPCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,4,6,7,8-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,4,7,8-PECDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,7,8-TCDD | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| OCDD | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| OCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0 | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Inorganics** | | | | | | | | | | | | | | | |
| Aluminum | mg/kg | 6900 | 7500 | 14000 | 11000 | 6100 | 16000 | 3700 | 3600 | 6400 | 27000 | 26000 | 37000 | 4800 | 4300 |
| Antimony | mg/kg | 0.83 U | 0.83 U | 0.83 UJ | 17 | 0.83 U | 510 | 0.83 U | 0.83 U | 4.4 U | 9.9 | 30 J | 8.5 J | 0.71 U | 0.72 U |
| Arsenic | mg/kg | 1.1 | 1.1 | 2.6 J | 5.1 | 1 | 23 | 0.75 J | 0.63 J | 2.8 J | 3.5 | 31 J | 9.3 J | 0.91 | 1 |
| Barium | mg/kg | 14 | 14 | 62 | 70 | 19 | 330 | 9.5 | 9.5 | 21 | 120 | 86 | 89 | 10 | 9.2 |
| Cadmium | mg/kg | 0.11 U | 0.11 U | 0.027 J | 1.3 | 0.11 U | 33 | 0.11 U | 0.11 U | 0.61 J | 19 | 17 | 24 | 0.052 J | 0.058 J |
| Calcium | mg/kg | 140 U | 140 U | 1100 | 1800 | 580 | 10000 | 140 U | 140 U | 750 U | 1700 | 1600 J | 1800 J | 120 U | 120 U |
| Chromium | mg/kg | 5.6 | 5.5 | 13 | 22 | 5.1 | 81 | 4 | 4 | 8.6 | 55 | 88 J | 140 J | 12 | 12 |
| Cobalt | mg/kg | 1.4 | 1.3 J | 3.1 | 2.5 | 1.6 | 14 | 0.76 J | 0.5 J | 2.5 J | 2.7 | 16 | 7.3 J | 0.74 J | 0.69 J |
| Copper | mg/kg | 2.4 J | 2.5 J | 6.5 | 130 | 2.3 J | 720 | 1.8 J | 1.6 J | 27 | 2400 | 6700 | 4200 | 5 | 5 |
| Iron | mg/kg | 2500 | 3200 | 9900 | 10000 | 3500 | 82000 | 1800 | 1800 | 20000 | 7100 | 160000 J | 14000 J | 3100 | 2900 |
| Lead | mg/kg | 16 | 2.4 | 6 | 4900 | 4.1 | 22000 | 3.1 | 2.6 | 30 | 770 | 780 J | 680 J | 2.9 | 2.9 |
| Magnesium | mg/kg | 260 J | 310 | 1100 | 1300 | 490 | 2100 | 130 J | 130 J | 610 J | 1200 | 1800 J | 2500 J | 260 | 230 J |
| Manganese | mg/kg | 16 | 39 | 220 | 96 | 58 | 710 | 29 | 20 | 160 | 270 | 710 J | 360 J | 33 | 30 |
| Mercury | mg/kg | 0.047 U | 0.041 U | 0.048 U | 0.065 J | 0.0092 J | 0.078 J | 0.043 U | 0.046 U | 0.01 J | 0.25 | 0.13 | 0.063 J | 0.039 U | 0.04 U |
| Nickel | mg/kg | 2.8 | 4.4 | 7.6 | 11 | 3 | 47 | 1.4 J | 1.3 J | 6.4 J | 22 | 94 J | 81 J | 3 | 2.8 |
| Potassium | mg/kg | 140 U | 140 U | 690 | 660 | 140 U | 650 U | 140 U | 140 U | 750 U | 420 | 750 U | 800 U | 120 U | 120 U |
| Selenium | mg/kg | 0.88 U | 0.88 U | 0.88 UJ | 0.96 U | 0.88 U | 4.3 U | 0.88 U | 0.88 U | 4.6 U | 1 U | 4.9 U | 5 U | 0.76 U | 0.77 U |
| Silver | mg/kg | 0.27 U | 0.27 U | 0.27 U | 0.59 J | 0.27 U | 9 | 0.27 U | 0.28 U | 1.5 U | 13 | 16 | 24 | 0.24 U | 0.24 U |
| Sodium | mg/kg | 19 J | 22 J | 46 J | 290 J | 27 J | 150 J | 140 U | 140 U | 750 U | 63 J | 750 U | 800 U | 32 J | 32 J |
| Thallium | mg/kg | 1.4 U | 1.4 U | 1.4 U | 1.6 U | 1.4 U | 6.5 U | 1.4 U | 1.4 U | 7.5 U | 1.6 U | 7.5 U | 8 U | 1.2 U | 1.2 U |
| Vanadium | mg/kg | 6.4 | 7.1 | 21 | 17 | 7.2 | 16 | 4.2 | 4.2 | 9.2 J | 11 | 25 | 21 | 5.6 | 5.1 |
| Zinc | mg/kg | 5.3 | 5 | 20 | 240 | 7.9 | 5400 | 16 | 17 | 60 | 600 | 1100 | 950 | 32 | 32 |

**Notes:**
FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TP11B | TP11C | TP12C | TP13B | TP13C | TP18B | TP19A | TP20B | TP20B | TP21B | TP22B | TP24A | TP24A | TP25C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-TP11B-00-12 | CDL-TP11C-00-12 | CDL-TP12C-00-009 | CDL-TP13B-00-010 | CDL-TP13C-00-006 | CDL-TP18B-00-008 | CDL-TP19A-00-009 | CDL-TP20B-00-010 | CDL-TP20B-01-010 | CDL-TP21B-00-007 | CDL-TP22B-00-004 | CDL-TP24A-00-012 | CDL-TP24A-01-012 | CDL-TP25C-00-034 |
| Sample Type | | N | N | N | N | N | N | N | N | FD | N | N | N | FD | N |
| Parent Sample # | | | | | | | | | | CDL-TP20B-00-010 | | | | CDL-TP24A-00-012 | |
| Sample Date | | 5/28/2015 | 5/28/2015 | 6/2/2015 | 6/4/2015 | 6/4/2015 | 6/9/2015 | 6/9/2015 | 6/8/2015 | 6/8/2015 | 6/9/2015 | 6/5/2015 | 6/10/2015 | 6/10/2015 | 5/12/2016 |
| Start Depth | | 11 | 11 | 4.5 | 4.5 | 2.5 | 3.5 | 4 | 4 | 4 | 3 | 1.5 | 5.5 | 5.5 | 16.5 |
| End Depth | | 12 | 12 | 5 | 5 | 3 | 4 | 4.5 | 4.5 | 4.5 | 3.5 | 2 | 6 | 6 | 17 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,1,2,2-Tetrachloroethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,1,2-Trichloroethane | µg/kg | 760 R | 22000 U | 5.1 U | 25000 J | 28000 | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,1-Dichloroethene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,2,4-Trichlorobenzene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,2-Dibromoethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,2-Dichlorobenzene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,2-Dichloroethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,2-Dichloropropane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,3-Dichlorobenzene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 1,4-Dichlorobenzene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| 2-Butanone (MEK) | µg/kg | 1500 R | 43000 U | 10 U | 4100 UJ | 7000 U | 11 U | 8.8 U | 19 | 25 | 7.2 U | 8.8 U | 7.5 U | 7.6 U | 8.8 U |
| 2-Hexanone | µg/kg | 1500 R | 43000 U | 10 U | 86000 J | 7000 U | 11 U | 8.8 U | 15 U | 12 U | 7.2 U | 8.8 U | 7.5 U | 7.6 U | 8.8 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 1500 R | 43000 U | 10 U | 74000 J | 7000 U | 11 U | 8.8 U | 15 U | 12 U | 7.2 U | 8.8 U | 7.5 U | 7.6 U | 8.8 U |
| Acetone | µg/kg | 1500 R | 44000 U | 10 U | 4000 UJ | 7200 U | 11 U | 9.2 U | 69 | 84 | 7.2 U | 12 J | 44 J | 83 J | 9.2 U |
| Benzene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 410 | 550 | 4.6 U |
| Bromodichloromethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Bromoform | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Bromomethane | µg/kg | 760 R | 22000 UJ | 5.1 UJ | 2100 UJ | 3500 UJ | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 UJ | 3.8 U | 3.8 U | 4.6 U |
| Carbon Disulfide | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Carbon Tetrachloride | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Chlorobenzene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Chloroethane | µg/kg | 760 R | 22000 U | 5.1 UJ | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 UJ | 3.8 U | 3.8 U | 4.6 U |
| Chloroform | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Chloromethane | µg/kg | 760 R | 22000 U | 5.1 UJ | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 UJ | 3.8 U | 3.8 U | 4.6 U |
| cis-1,2-Dichloroethene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| cis-1,3-Dichloropropene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Cyclohexane | µg/kg | 760 R | 22000 U | 5.1 U | 14000 J | 38000 | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 220 | 190 | 4.6 U |
| Dibromochloromethane | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Dichlorodifluoromethane | µg/kg | 760 R | 22000 U | 5.1 UJ | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 UJ | 3.8 U | 3.8 U | 4.6 U |
| Ethylbenzene | µg/kg | 760 R | 22000 U | 5.1 U | 9100 J | 16000 | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 1300 J | 2300 J | 4.6 U |
| Isopropylbenzene | µg/kg | 520 J | 11000 J | 5.1 U | 2500 J | 4100 J | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 43 | 44 | 4.6 U |
| Methyl Acetate | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Methyl Tert-Butyl Ether | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Methylcylohexane | µg/kg | 3500 J | 170000 | 5.1 U | 12000 J | 66000 | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 1300 J | 2300 J | 4.6 U |
| Methylene Chloride | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Styrene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Tetrachloroethene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Toluene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 1200 | 1900 | 4.6 U |
| trans-1,2-Dichloroethene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| trans-1,3-Dichloropropene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Trichloroethene | µg/kg | 760 R | 22000 U | 5.1 U | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 UJ | 6.2 UJ | 3.6 U | 4.2 U | 3.8 U | 3.8 U | 4.6 U |
| Trichlorofluoromethane | µg/kg | 760 R | 22000 U | 5.1 UJ | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 UJ | 3.8 U | 3.8 U | 4.6 U |
| Vinyl Chloride | µg/kg | 760 R | 22000 U | 5.1 UJ | 2100 UJ | 3500 U | 5.4 U | 4.6 U | 7.6 U | 6.2 U | 3.6 U | 4.2 UJ | 3.8 U | 3.8 U | 4.6 U |
| Xylenes (Total) | µg/kg | 2000 J | 45000 | 10 U | 16000 J | 59000 | 11 U | 9.1 U | 15 U | 12 U | 7.2 U | 8.5 U | 9400 J | 16000 J | 9.1 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/kg | 300 J | 1000 | 160 U | 680 J | 910 J | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2,4,5-Trichlorophenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2,4,6-Trichlorophenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2,4-Dichlorophenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2,4-Dimethylphenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 68 J | 150 U | 150 U |
| 2,4-Dinitrophenol | µg/kg | 780 R | 800 U | 800 U | 3900 U | 3800 U | 810 U | 760 U | 980 U | 980 U | 770 U | 810 U | 770 U | 760 U | 760 U |
| 2,4-Dinitrotoluene | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TP11B | TP11C | TP12C | TP13B | TP13C | TP18B | TP19A | TP20B | TP20B | TP21B | TP22B | TP24A | TP24A | TP25C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-TP11B-00-12 | CDL-TP11C-00-12 | CDL-TP12C-00-009 | CDL-TP13B-00-010 | CDL-TP13C-00-006 | CDL-TP18B-00-008 | CDL-TP19A-00-009 | CDL-TP20B-00-010 | CDL-TP20B-01-010 | CDL-TP21B-00-007 | CDL-TP22B-00-004 | CDL-TP24A-00-012 | CDL-TP24A-01-012 | CDL-TP25C-00-034 |
| Sample Type | | N | N | N | N | N | N | N | N | FD | N | N | N | FD | N |
| Parent Sample # | | | | | | | | | | CDL-TP20B-00-010 | | | | CDL-TP24A-00-012 | |
| Sample Date | | 5/28/2015 | 5/28/2015 | 6/2/2015 | 6/4/2015 | 6/4/2015 | 6/9/2015 | 6/9/2015 | 6/8/2015 | 6/8/2015 | 6/9/2015 | 6/5/2015 | 6/10/2015 | 6/10/2015 | 5/12/2016 |
| Start Depth | | 11 | 11 | 4.5 | 4.5 | 2.5 | 3.5 | 4 | 4 | 4 | 3 | 1.5 | 5.5 | 5.5 | 16.5 |
| End Depth | | 12 | 12 | 5 | 5 | 3 | 4 | 4.5 | 4.5 | 4.5 | 3.5 | 2 | 6 | 6 | 17 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2-Chloronaphthalene | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2-Chlorophenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2-Methylnaphthalene | µg/kg | 2400 J | 11000 | 64 J | 4400 | 10000 | 20 U | 19 U | 23 U | 24 U | 24 J | 20 U | 93 J | 87 J | 19 U |
| 2-Methylphenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2-Nitroaniline | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 2-Nitrophenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 3,3'-Dichlorobenzidine | µg/kg | 190 R | 200 UJ | 200 UJ | 960 UJ | 940 UJ | 200 U | 190 U | 240 U | 240 U | 190 U | 200 U | 190 U | 190 U | 190 U |
| 3-Nitroaniline | µg/kg | 160 R | 160 U | 160 U | 780 U | 220 J | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 780 R | 800 UJ | 800 UJ | 3900 UJ | 3800 UJ | 810 U | 760 U | 980 U | 980 U | 770 U | 810 U | 770 U | 760 U | 760 U |
| 4-Bromophenyl Phenyl Ether | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 4-Chloro-3-Methylphenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 4-Chloroaniline | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 4-Nitroaniline | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| 4-Nitrophenol | µg/kg | 780 R | 800 UJ | 800 U | 3900 U | 3800 U | 810 U | 760 U | 980 U | 980 U | 770 U | 810 U | 770 U | 760 U | 760 U |
| Acenaphthene | µg/kg | 19 R | 550 J | 240 J | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 42 J | 20 UJ | 160 J | 170 J | 19 U |
| Acenaphthylene | µg/kg | 19 R | 20 U | 20 U | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 66 J | 120 U | 38 J | 77 J | 19 U |
| Acetophenone | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Anthracene | µg/kg | 170 J | 210 J | 500 | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 160 J | 20 U | 260 J | 390 | 19 U |
| Atrazine | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Benzaldehyde | µg/kg | 160 R | 160 U | 160 U | 780 U | 760 U | 160 U | 150 U | 200 U | 45 J | 150 U | 160 U | 150 U | 150 U | 150 U |
| Benzo(a)Anthracene | µg/kg | 130 J | 130 | 1500 | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 130 J | 20 U | 710 | 540 | 19 U |
| Benzo(a)Pyrene | µg/kg | 100 J | 85 | 1700 | 95 U | 95 U | 20 U | 19 U | 44 J | 24 U | 270 J | 20 UJ | 870 | 660 | 19 U |
| Benzo(b)Fluoranthene | µg/kg | 120 J | 120 J | 2100 J | 95 UJ | 95 UJ | 20 U | 19 U | 23 U | 24 U | 650 | 20 U | 1200 | 890 | 19 U |
| Benzo(g,h,i)Perylene | µg/kg | 39 J | 20 U | 630 | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 300 J | 41 J | 450 | 310 J | 19 U |
| Benzo(k)Fluoranthene | µg/kg | 47 J | 45 | 940 | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 260 J | 20 U | 480 | 360 J | 19 U |
| Benzyl Butyl Phthalate | µg/kg | 160 R | 160 UJ | 160 UJ | 780 UJ | 780 UJ | 160 U | 150 U | 190 U | 200 U | 160 U | 160 UJ | 160 U | 150 U | 150 U |
| Bis(2-Chloroethoxy)Methane | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Bis(2-Chloroethyl) Ether | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 160 R | 160 UJ | 4600 J | 780 UJ | 780 UJ | 160 U | 150 U | 190 U | 200 U | 160 U | 160 UJ | 160 U | 150 U | 150 U |
| Caprolactam | µg/kg | 160 R | 160 UJ | 160 UJ | 780 UJ | 760 UJ | 160 U | 150 U | 200 U | 200 U | 150 U | 160 U | 150 U | 150 U | 150 U |
| Carbazole | µg/kg | 160 R | 160 U | 280 J | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 40 J | 160 U | 60 J | 100 J | 150 U |
| Chrysene | µg/kg | 91 J | 76 | 1600 | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 160 J | 20 U | 800 | 580 | 19 U |
| m & p Cresol | µg/kg | 160 R | 160 U | 160 U | 790 U | 770 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Dibenzo(a,h)Anthracene | µg/kg | 19 R | 20 UJ | 20 UJ | 95 UJ | 95 UJ | 20 U | 19 U | 23 U | 24 U | 19 U | 20 U | 19 U | 19 U | 19 U |
| Dibenzofuran | µg/kg | 220 J | 160 U | 110 J | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 28 J | 160 U | 110 J | 130 J | 150 U |
| Diethyl Phthalate | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Dimethyl Phthalate | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Di-N-Butylphthalate | µg/kg | 160 R | 65 | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Di-N-Octylphthalate | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Fluoranthene | µg/kg | 380 J | 320 | 3100 | 95 U | 95 U | 13 J | 14 J | 29 J | 26 J | 450 | 20 U | 1700 | 1700 | 19 U |
| Fluorene | µg/kg | 260 J | 510 | 210 J | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 38 J | 20 U | 200 J | 230 J | 19 U |
| Hexachloro-1,3-Butadiene | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Hexachlorobenzene | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Hexachlorocyclopentadiene | µg/kg | 780 R | 800 U | 800 U | 3900 U | 3800 U | 810 U | 760 U | 980 UJ | 980 U | 770 U | 810 U | 770 U | 760 U | 760 U |
| Hexachloroethane | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 37 J | 20 U | 540 | 95 U | 95 U | 20 U | 19 U | 23 U | 24 U | 350 J | 20 U | 400 | 310 J | 19 U |
| Isophorone | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Naphthalene | µg/kg | 590 J | 4000 | 96 J | 2200 | 3500 | 20 U | 19 U | 23 U | 24 U | 19 U | 20 U | 540 | 500 | 19 U |
| Nitrobenzene | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| N-Nitroso-Di-N-Propylamine | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| N-Nitrosodiphenylamine | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Total High Molecular Weight PAHs | µg/kg | 1194 | 1016 | 14710 | 0 U | 0 U | 13 | 14 | 95 | 50 | 3000 | 41 | 7810 | 6450 | 0 U |
| Total Low Molecular Weight PAHs | µg/kg | 1670 | 6060 | 3046 | 2450 | 3740 | 0 U | 0 U | 0 U | 24 | 516 | 0 U | 2698 | 3267 | 0 U |

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TP11B | TP11C | TP12C | TP13B | TP13C | TP18B | TP19A | TP20B | TP20B | TP21B | TP22B | TP24A | TP24A | TP25C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-TP11B-00-12 | CDL-TP11C-00-12 | CDL-TP12C-00-009 | CDL-TP13B-00-010 | CDL-TP13C-00-006 | CDL-TP18B-00-008 | CDL-TP19A-00-009 | CDL-TP20B-00-010 | CDL-TP20B-01-010 | CDL-TP21B-00-007 | CDL-TP22B-00-004 | CDL-TP24A-00-012 | CDL-TP24A-01-012 | CDL-TP25C-00-034 |
| Sample Type | | N | N | N | N | N | N | N | N | FD | N | N | N | FD | N |
| Parent Sample # | | | | | | | | | | CDL-TP20B-00-010 | | | | CDL-TP24A-00-012 | |
| Sample Date | | 5/28/2015 | 5/28/2015 | 6/2/2015 | 6/4/2015 | 6/4/2015 | 6/9/2015 | 6/9/2015 | 6/8/2015 | 6/8/2015 | 6/9/2015 | 6/5/2015 | 6/10/2015 | 6/10/2015 | 5/12/2016 |
| Start Depth | | 11 | 11 | 4.5 | 4.5 | 2.5 | 3.5 | 4 | 4 | 4 | 3 | 1.5 | 5.5 | 5.5 | 16.5 |
| End Depth | | 12 | 12 | 5 | 5 | 3 | 4 | 4.5 | 4.5 | 4.5 | 3.5 | 2 | 6 | 6 | 17 |
| Depth Unit | | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| Pentachlorophenol | µg/kg | 310 R | 320 UJ | 320 U | 1600 U | 1500 U | 320 U | 300 U | 390 U | 390 U | 310 U | 330 U | 310 U | 310 U | 300 U |
| Phenanthrene | µg/kg | 650 J | 790 J | 2000 | 250 J | 240 J | 20 U | 19 U | 23 U | 24 J | 210 J | 20 U | 1500 | 1900 | 19 U |
| Phenol | µg/kg | 160 R | 160 U | 160 U | 780 U | 780 U | 160 U | 150 U | 190 U | 200 U | 160 U | 160 U | 160 U | 150 U | 150 U |
| Pyrene | µg/kg | 250 J | 240 | 2600 | 95 U | 95 U | 20 U | 19 U | 22 J | 24 J | 430 | 20 U | 1200 | 1100 | 19 U |
| **Dioxins/Furans** | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | 46.6 J | 59.5 J | NA | NA | NA | NA | NA |
| 1,2,3,4,6,7,8-HPCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 9.11 | 14.4 J | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8,9-HPCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 3.23 U | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 3.23 U | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 1.79 J | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 2.23 J | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 3.23 U | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | 1.83 J | 2.2 J | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 3.23 U | NA | NA | NA | NA | NA |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 3.23 U | NA | NA | NA | NA | NA |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 3.23 U | NA | NA | NA | NA | NA |
| 2,3,4,6,7,8-HXCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.27 U | 2.04 J | NA | NA | NA | NA | NA |
| 2,3,4,7,8-PECDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 1.69 J | 1.65 J | NA | NA | NA | NA | NA |
| 2,3,7,8-TCDD | pg/g | NA | NA | NA | NA | NA | NA | NA | 0.652 U | 0.645 U | NA | NA | NA | NA | NA |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | NA | NA | NA | NA | NA | NA | NA | 2.3 J | 2.5 J | NA | NA | NA | NA | NA |
| OCDD | pg/g | NA | NA | NA | NA | NA | NA | NA | 2960 J | 3750 J | NA | NA | NA | NA | NA |
| OCDF | pg/g | NA | NA | NA | NA | NA | NA | NA | 6.4 J | 10.3 | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0 | pg/g | NA | NA | NA | NA | NA | NA | NA | 2.37 | 3.45 | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | NA | NA | NA | NA | NA | NA | NA | 3.87 | 4.69 | NA | NA | NA | NA | NA |
| **Inorganics** | | | | | | | | | | | | | | | |
| Aluminum | mg/kg | 18000 | 11000 | 9100 | 7500 | 5600 | 11000 | 8200 | 17000 | 20000 | 13000 | 12000 | 13000 | 11000 | 4200 |
| Antimony | mg/kg | 1.7 U | 0.9 U | 7.9 J | 0.83 U | 0.83 U | 170 | 10 J | 2.5 J | 3.6 J | 0.73 J | 0.9 U | 0.59 J | 1.7 U | 0.83 U |
| Arsenic | mg/kg | 4.4 | 3 | 6 | 0.99 | 0.85 | 52 | 18 | 9.7 J | 8.5 | 4.1 | 3.8 | 6.9 | 6.7 | 0.77 J |
| Barium | mg/kg | 57 | 39 | 95 | 11 | 19 | 320 | 180 | 64 | 62 | 62 | 58 | 57 | 52 | 10 |
| Cadmium | mg/kg | 0.056 J | 0.029 J | 0.53 | 0.028 J | 0.027 J | 12 | 9.4 | 5.3 | 7.4 | 0.62 | 0.24 J | 0.91 J | 3.2 J | 0.028 J |
| Calcium | mg/kg | 850 | 470 | 11000 | 450 | 260 J | 20000 | 6800 | 2200 | 2500 | 790 | 600 | 1200 | 1200 | 130 J |
| Chromium | mg/kg | 16 | 10 | 13 | 6.4 | 5.5 | 94 | 58 | 39 | 58 | 17 | 12 | 15 | 13 | 2.8 |
| Cobalt | mg/kg | 3.5 | 2.5 | 2.9 | 1.4 | 1.3 J | 28 | 11 | 3.2 J | 3 J | 4.1 | 3.2 | 2.9 | 2.5 J | 0.36 J |
| Copper | mg/kg | 5.7 | 3.7 | 20 | 2.6 | 1.7 | 1700 | 330 | 740 | 1200 | 69 | 18 | 15 | 13 | 0.91 |
| Iron | mg/kg | 14000 | 6600 | 9700 | 3000 | 2800 | 250000 | 140000 | 8900 | 11000 | 14000 | 8400 | 8200 | 7400 | 1900 |
| Lead | mg/kg | 10 | 15 | 170 J | 96 | 12 | 3400 | 520 | 190 | 310 | 47 | 15 | 31 | 39 | 5 |
| Magnesium | mg/kg | 1200 | 790 | 1600 J | 310 | 520 | 2200 | 1200 | 1400 | 1500 | 1200 | 1100 | 1000 | 890 | 170 J |
| Manganese | mg/kg | 150 | 57 | 170 J | 19 | 23 | 1600 | 640 | 140 | 210 | 280 | 260 | 140 | 150 | 30 |
| Mercury | mg/kg | 0.04 J | 0.012 J | 0.076 J | 0.046 U | 0.046 U | 0.25 | 0.11 | 0.19 | 0.22 | 0.039 J | 0.052 J | 0.23 | 0.095 | 0.043 U |
| Nickel | mg/kg | 8 | 6.1 | 11 | 4.1 | 3.2 | 120 | 110 | 27 J | 50 J | 11 | 6.6 | 6.7 | 5.9 | 1 J |
| Potassium | mg/kg | 720 | 500 | 620 J | 240 J | 450 | 720 | 410 J | 590 J | 500 J | 510 J | 550 | 660 | 520 J | 170 J |
| Selenium | mg/kg | 1.8 U | 0.96 U | 0.88 U | 0.88 U | 0.88 U | 1.9 U | 1.2 J | 2.1 U | 1.5 J | 1.8 U | 0.96 U | 1.8 U | 1.8 U | 0.88 U |
| Silver | mg/kg | 0.55 U | 0.29 U | 0.12 J | 0.28 U | 0.27 U | 4.3 | 19 | 5.1 | 8.6 | 0.55 U | 0.3 U | 0.55 U | 0.55 U | 0.28 U |
| Sodium | mg/kg | 280 U | 37 J | 110 J | 27 J | 56 J | 410 J | 110 J | 80 J | 80 J | 62 J | 77 J | 280 U | 270 U | 140 U |
| Thallium | mg/kg | 2.8 U | 1.5 U | 1.4 U | 1.4 U | 1.4 U | 3 U | 2.8 U | 3.3 U | 3.6 U | 2.8 U | 1.5 U | 2.8 U | 2.7 U | 1.4 U |
| Vanadium | mg/kg | 27 | 15 | 15 | 7.6 | 8 | 22 | 15 | 17 | 15 | 18 | 16 | 18 | 16 | 5 |
| Zinc | mg/kg | 28 | 15 | 540 | 6.2 | 7.5 | 2200 | 1900 | 310 J | 320 J | 160 | 26 | 70 | 58 | 2.9 |

**Notes:**
FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TP26B | TP27A | TP27A |
|---|---|---|---|---|
| Sample # | | CDL-TP26B-00-010 | CDL-TP27A-00-004 | CDL-TP27A-01-004 |
| Sample Type | | N | N | FD |
| Parent Sample # | | | | CDL-TP27A-00-004 |
| Sample Date | | 5/11/2016 | 5/10/2016 | 5/10/2016 |
| Start Depth | | 4 | 1.5 | 1.5 |
| End Depth | | 4.5 | 1.5 | 1.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | |
| **Volatile Organic Compounds** | | | | |
| 1,1,1-Trichloroethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,1,2,2-Tetrachloroethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,1,2-Trichloroethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,1-Dichloroethene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,2,4-Trichlorobenzene | µg/kg | 5.3 UJ | 4.3 UJ | 3.4 UJ |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 5.3 UJ | 4.3 U | 3.4 UJ |
| 1,2-Dibromoethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,2-Dichlorobenzene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,2-Dichloroethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| 1,2-Dichloropropane | µg/kg | 5.3 UJ | 4.3 U | 3.4 UJ |
| 1,3-Dichlorobenzene | µg/kg | 5.3 UJ | 4.3 UJ | 3.4 UJ |
| 1,4-Dichlorobenzene | µg/kg | 5.3 UJ | 4.3 UJ | 3.4 UJ |
| 2-Butanone (MEK) | µg/kg | 10 U | 8.8 U | 6.9 UJ |
| 2-Hexanone | µg/kg | 10 U | 8.8 U | 6.9 UJ |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 10 U | 8.8 U | 6.9 UJ |
| Acetone | µg/kg | 10 U | 8.8 U | 6.8 UJ |
| Benzene | µg/kg | 5.3 U | 4.3 U | 1.4 J |
| Bromodichloromethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Bromoform | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Bromomethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Carbon Disulfide | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Carbon Tetrachloride | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Chlorobenzene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Chloroethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Chloroform | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Chloromethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| cis-1,2-Dichloroethene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| cis-1,3-Dichloropropene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Cyclohexane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Dibromochloromethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Dichlorodifluoromethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Ethylbenzene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Isopropylbenzene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Methyl Acetate | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Methyl Tert-Butyl Ether | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Methylcylohexane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Methylene Chloride | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Styrene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Tetrachloroethene | µg/kg | 5.3 UJ | 4.3 UJ | 3.4 UJ |
| Toluene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| trans-1,2-Dichloroethene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| trans-1,3-Dichloropropene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Trichloroethene | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Trichlorofluoromethane | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Vinyl Chloride | µg/kg | 5.3 U | 4.3 U | 3.4 UJ |
| Xylenes (Total) | µg/kg | 11 U | 8.6 U | 6.9 UJ |
| **Semi-Volatile Organic Compounds** | | | | |
| 1,1'-Biphenyl | µg/kg | 1600 U | 160 U | 140 U |
| 2,4,5-Trichlorophenol | µg/kg | 1600 U | 160 U | 140 U |
| 2,4,6-Trichlorophenol | µg/kg | 1600 U | 160 U | 140 U |
| 2,4-Dichlorophenol | µg/kg | 1600 U | 160 U | 140 U |
| 2,4-Dimethylphenol | µg/kg | 1600 U | 160 U | 140 U |
| 2,4-Dinitrophenol | µg/kg | 8100 U | 810 U | 670 U |
| 2,4-Dinitrotoluene | µg/kg | 1600 U | 160 U | 140 U |

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TP26B | TP27A | TP27A |
|---|---|---|---|---|
| Sample # | | CDL-TP26B-00-010 | CDL-TP27A-00-004 | CDL-TP27A-01-004 |
| Sample Type | | N | N | FD |
| Parent Sample # | | | | CDL-TP27A-00-004 |
| Sample Date | | 5/11/2016 | 5/10/2016 | 5/10/2016 |
| Start Depth | | 4 | 1.5 | 1.5 |
| End Depth | | 4.5 | 1.5 | 1.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | |
| 2,6-Dinitrotoluene | µg/kg | 1600 U | 160 U | 140 U |
| 2-Chloronaphthalene | µg/kg | 1600 U | 160 U | 140 U |
| 2-Chlorophenol | µg/kg | 1600 U | 160 U | 140 U |
| 2-Methylnaphthalene | µg/kg | 860 J | 20 U | 17 U |
| 2-Methylphenol | µg/kg | 1600 U | 160 U | 140 U |
| 2-Nitroaniline | µg/kg | 1600 U | 160 U | 140 U |
| 2-Nitrophenol | µg/kg | 1600 U | 160 U | 140 U |
| 3,3'-Dichlorobenzidine | µg/kg | 2000 U | 200 U | 160 U |
| 3-Nitroaniline | µg/kg | 1600 U | 160 U | 140 U |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 8100 U | 810 U | 670 U |
| 4-Bromophenyl Phenyl Ether | µg/kg | 1600 U | 160 U | 140 U |
| 4-Chloro-3-Methylphenol | µg/kg | 1600 U | 160 U | 140 U |
| 4-Chloroaniline | µg/kg | 1600 U | 160 U | 140 U |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 1600 U | 160 U | 140 U |
| 4-Nitroaniline | µg/kg | 1600 U | 160 U | 140 U |
| 4-Nitrophenol | µg/kg | 8100 U | 810 U | 670 U |
| Acenaphthene | µg/kg | 4000 | 20 U | 17 U |
| Acenaphthylene | µg/kg | 430 J | 20 U | 17 U |
| Acetophenone | µg/kg | 1600 U | 160 U | 140 U |
| Anthracene | µg/kg | 13000 | 20 U | 17 U |
| Atrazine | µg/kg | 1600 U | 160 U | 140 U |
| Benzaldehyde | µg/kg | 1600 U | 160 U | 130 U |
| Benzo(a)Anthracene | µg/kg | 27000 | 17 J | 17 U |
| Benzo(a)Pyrene | µg/kg | 23000 | 10 J | 17 U |
| Benzo(b)Fluoranthene | µg/kg | 29000 | 15 J | 17 U |
| Benzo(g,h,i)Perylene | µg/kg | 9600 | 20 U | 10 J |
| Benzo(k)Fluoranthene | µg/kg | 11000 | 20 U | 17 U |
| Benzyl Butyl Phthalate | µg/kg | 1600 U | 160 U | 140 U |
| Bis(2-Chloroethoxy)Methane | µg/kg | 1600 U | 160 U | 140 U |
| Bis(2-Chloroethyl) Ether | µg/kg | 1600 U | 160 U | 140 U |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 1600 U | 160 U | 140 U |
| Caprolactam | µg/kg | 1600 U | 160 U | 130 U |
| Carbazole | µg/kg | 4200 | 160 U | 140 U |
| Chrysene | µg/kg | 25000 | 20 U | 17 U |
| m & p Cresol | µg/kg | 1700 U | 170 U | 130 U |
| Dibenzo(a,h)Anthracene | µg/kg | 200 U | 20 U | 17 U |
| Dibenzofuran | µg/kg | 2200 J | 160 U | 140 U |
| Diethyl Phthalate | µg/kg | 1600 U | 160 U | 140 U |
| Dimethyl Phthalate | µg/kg | 1600 U | 160 U | 140 U |
| Di-N-Butylphthalate | µg/kg | 1600 U | 160 U | 140 U |
| Di-N-Octylphthalate | µg/kg | 1600 U | 160 U | 140 U |
| Fluoranthene | µg/kg | 50000 | 26 J | 17 U |
| Fluorene | µg/kg | 5300 | 20 U | 17 U |
| Hexachloro-1,3-Butadiene | µg/kg | 1600 U | 160 U | 140 U |
| Hexachlorobenzene | µg/kg | 1600 U | 160 U | 140 U |
| Hexachlorocyclopentadiene | µg/kg | 8100 U | 810 U | 670 U |
| Hexachloroethane | µg/kg | 1600 U | 160 U | 140 U |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 9600 | 20 U | 17 U |
| Isophorone | µg/kg | 1600 U | 160 U | 140 U |
| Naphthalene | µg/kg | 1000 J | 20 U | 17 U |
| Nitrobenzene | µg/kg | 1600 U | 160 U | 140 U |
| N-Nitroso-Di-N-Propylamine | µg/kg | 1600 U | 160 U | 140 U |
| N-Nitrosodiphenylamine | µg/kg | 1600 U | 160 U | 140 U |
| Total High Molecular Weight PAHs | µg/kg | 229200 | 90 | 10 |
| Total Low Molecular Weight PAHs | µg/kg | 62730 | 0 U | 0 U |

**Table C-4**
**Soil Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TP26B | TP27A | TP27A |
|---|---|---|---|---|
| Sample # | | CDL-TP26B-00-010 | CDL-TP27A-00-004 | CDL-TP27A-01-004 |
| Sample Type | | N | N | FD |
| Parent Sample # | | | | CDL-TP27A-00-004 |
| Sample Date | | 5/11/2016 | 5/10/2016 | 5/10/2016 |
| Start Depth | | 4 | 1.5 | 1.5 |
| End Depth | | 4.5 | 1.5 | 1.5 |
| Depth Unit | | ft bgs | ft bgs | ft bgs |
| Analyte | Units | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | |
| Pentachlorophenol | µg/kg | 3300 U | 330 U | 270 U |
| Phenanthrene | µg/kg | 39000 | 20 U | 17 U |
| Phenol | µg/kg | 1600 U | 160 U | 140 U |
| Pyrene | µg/kg | 45000 | 22 J | 17 U |
| **Dioxins/Furans** | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | NA | 289 | 208 |
| 1,2,3,4,6,7,8-HPCDF | pg/g | NA | 45.4 J | 41.2 J |
| 1,2,3,4,7,8,9-HPCDF | pg/g | NA | 3.32 J | 3.3 J |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | 5.71 | 4.6 |
| 1,2,3,4,7,8-HXCDF | pg/g | NA | 10 | 10.8 |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | 12.9 | 9.75 |
| 1,2,3,6,7,8-HXCDF | pg/g | NA | 9.48 | 9.64 |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | NA | 11.6 | 8.83 |
| 1,2,3,7,8,9-HXCDF | pg/g | NA | 2.8 J | 2.79 J |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | NA | 7.21 | 7.9 |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | NA | 5.16 | 4.46 |
| 2,3,4,6,7,8-HXCDF | pg/g | NA | 13 | 12.8 |
| 2,3,4,7,8-PECDF | pg/g | NA | 13.9 | 13.7 |
| 2,3,7,8-TCDD | pg/g | NA | 1.38 | 1.2 |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | NA | 12.7 | 14.1 J |
| OCDD | pg/g | NA | 12600 J | 8950 J |
| OCDF | pg/g | NA | 24.1 | 22 |
| Total TEQ (WHO 2005) ND = 0 | pg/g | NA | 25.8 | 22.5 |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | NA | 25.8 | 22.5 |
| **Inorganics** | | | | |
| Aluminum | mg/kg | 12000 | 11000 | 11000 |
| Antimony | mg/kg | 1.6 J | 6.8 J | 2.8 J |
| Arsenic | mg/kg | 59 | 8.4 | 4.7 |
| Barium | mg/kg | 510 | 710 J | 280 J |
| Cadmium | mg/kg | 2 | 3.4 | 1.1 |
| Calcium | mg/kg | 18000 | 5300 J | 1700 J |
| Chromium | mg/kg | 63 | 58 | 17 |
| Cobalt | mg/kg | 12 | 15 | 4.1 |
| Copper | mg/kg | 82 | 180 J | 56 J |
| Iron | mg/kg | 35000 | 160000 | 20000 |
| Lead | mg/kg | 1000 | 250 | 190 |
| Magnesium | mg/kg | 14000 | 1200 J | 950 |
| Manganese | mg/kg | 160 | 980 J | 330 J |
| Mercury | mg/kg | 0.14 | 0.047 J | 0.045 J |
| Nickel | mg/kg | 31 | 35 | 14 |
| Potassium | mg/kg | 1700 | 430 | 390 |
| Selenium | mg/kg | 4.8 U | 8.8 U | 0.76 U |
| Silver | mg/kg | 0.3 U | 15 | 4.6 |
| Sodium | mg/kg | 51 J | 130 J | 75 J |
| Thallium | mg/kg | 1.5 U | 1.4 U | 1.2 U |
| Vanadium | mg/kg | 23 | 15 J | 14 |
| Zinc | mg/kg | 750 | 430 J | 160 J |

**Notes:**
FD = field duplicate
ft bgs = feet below ground surface
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW1 | DPW10 | DPW11 | DPW12 | DPW13 | DPW14 | DPW14 | DPW15 | DPW16 | DPW16 | DPW17 | DPW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW01-00-3039 | CDL-DPW10-00-1726 | CDL-DPW11-00-2130 | CDL-DPW12-00-2332 | CDL-DPW13-00-3544 | CDL-DPW14-00-3140 | CDL-DPW14-01-3140 | CDL-DPW15-00-3140 | CDL-DPW16-00-2130 | CDL-DPW16-01-2130 | CDL-DPW17-00-1928 | CDL-DPW02-00-2130 |
| Sample Type | | N | N | N | N | N | N | FD | N | N | FD | N | N |
| Parent Sample # | | | | | | | | CDL-DPW14-00-3140 | | | CDL-DPW16-00-2130 | | |
| Sample Date | | 7/21/2015 | 7/21/2015 | 7/27/2015 | 5/6/2016 | 5/4/2016 | 5/5/2016 | 5/5/2016 | 5/5/2016 | 5/4/2016 | 5/4/2016 | 5/10/2016 | 7/22/2015 |
| Start Depth | | 14.5 | 8 | 10 | 11 | 17 | 10 | 10 | 15 | 10 | 10 | 9 | 10 |
| End Depth | | 19.5 | 13 | 15 | 16 | 22 | 15 | 15 | 20 | 15 | 15 | 11 | 15 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,1,2-Trichloroethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,1-Dichloroethene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,2,4-Trichlorobenzene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,2-Dibromoethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,2-Dichlorobenzene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,2-Dichloroethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.2 J | 40 U |
| 1,2-Dichloropropane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,3-Dichlorobenzene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 1,4-Dichlorobenzene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| 2-Butanone (MEK) | µg/l | 400 U | 4 U | 4 U | 4 U | 4 U | 80 U | 80 U | 4 U | 4 U | 4 U | 4 U | 200 U |
| 2-Hexanone | µg/l | 400 U | 4 U | 4 U | 4 U | 4 U | 80 U | 80 U | 4 U | 4 U | 4 U | 4 U | 200 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 400 U | 4 U | 4 U | 4 U | 4 U | 80 U | 80 U | 4 U | 4 U | 4 U | 4 U | 200 U |
| Acetone | µg/l | 400 U | 4 U | 9 J | 4 U | 4 U | 80 U | 80 U | 4 U | 4 U | 4 U | 4 U | 200 U |
| Benzene | µg/l | 1400 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 2100 |
| Bromodichloromethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Bromoform | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Bromomethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Carbon Disulfide | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Carbon Tetrachloride | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Chlorobenzene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Chloroethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Chloroform | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Chloromethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| cis-1,2-Dichloroethene | µg/l | 80 U | 0.8 U | 0.37 J | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 18 J |
| cis-1,3-Dichloropropene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Cyclohexane | µg/l | 440 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 490 | 360 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 420 |
| Dibromochloromethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Dichlorodifluoromethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Ethylbenzene | µg/l | 490 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 630 | 610 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 74 |
| Isopropylbenzene | µg/l | 51 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 53 | 56 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 49 J |
| Methyl Acetate | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Methyl Tert-Butyl Ether | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Methylcylohexane | µg/l | 300 J | 0.8 U | 0.8 U | 0.8 U | 1.8 J | 440 | 330 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 170 J |
| Methylene Chloride | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Styrene | µg/l | 21 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Tetrachloroethene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 14 J | 14 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Toluene | µg/l | 9800 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 1100 | 990 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 14 J |
| trans-1,2-Dichloroethene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| trans-1,3-Dichloropropene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Trichloroethene | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Trichlorofluoromethane | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Vinyl Chloride | µg/l | 80 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 16 U | 16 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 40 U |
| Xylenes (Total) | µg/l | 2700 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 3900 | 3800 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 2400 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 4 | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 3.7 J | 3.1 J | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 2.4 |
| 2,4,5-Trichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 2,4,6-Trichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 2,4-Dichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 2,4-Dimethylphenol | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| 2,4-Dinitrophenol | µg/l | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 U | 3.2 U | 3.2 UJ | 3.2 U | 3.2 U |
| 2,4-Dinitrotoluene | µg/l | 1 U | 1 U | 1 U | 1 U | 1 UJ | 1 UJ | 1 UJ | 1 U | 1 U | 1 UJ | 1 U | 1 U |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW1 | DPW10 | DPW11 | DPW12 | DPW13 | DPW14 | DPW14 | DPW15 | DPW16 | DPW16 | DPW17 | DPW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW01-00-3039 | CDL-DPW10-00-1726 | CDL-DPW11-00-2130 | CDL-DPW12-00-2332 | CDL-DPW13-00-3544 | CDL-DPW14-00-3140 | CDL-DPW14-01-3140 | CDL-DPW15-00-3140 | CDL-DPW16-00-2130 | CDL-DPW16-01-2130 | CDL-DPW17-00-1928 | CDL-DPW02-00-2130 |
| Sample Type | | N | N | N | N | N | N | FD | N | N | FD | N | N |
| Parent Sample # | | | | | | | | CDL-DPW14-00-3140 | | | CDL-DPW16-00-2130 | | |
| Sample Date | | 7/21/2015 | 7/21/2015 | 7/27/2015 | 5/6/2016 | 5/4/2016 | 5/5/2016 | 5/5/2016 | 5/5/2016 | 5/4/2016 | 5/4/2016 | 5/10/2016 | 7/22/2015 |
| Start Depth | | 14.5 | 8 | 10 | 11 | 17 | 10 | 10 | 15 | 10 | 10 | 9 | 10 |
| End Depth | | 19.5 | 13 | 15 | 16 | 22 | 15 | 15 | 20 | 15 | 15 | 11 | 15 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | µg/l | 1 U | 1 U | 1 U | 1 U | 1 UJ | 1 UJ | 1 UJ | 1 U | 1 U | 1 UJ | 1 U | 1 U |
| 2-Chloronaphthalene | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 2-Chlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 2-Methylnaphthalene | µg/l | 38 | 0.13 J | 0.1 U | 0.1 U | 0.1 UJ | 45 | 38 | 0.065 J | 0.1 U | 0.1 UJ | 0.1 U | 15 |
| 2-Methylphenol | µg/l | 7.3 | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 2-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U |
| 2-Nitrophenol | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| 3,3'-Dichlorobenzidine | µg/l | 2 U | 2 U | 2 U | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 R | 2 U |
| 3-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| 4-Chloroaniline | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| 4-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 UJ | 1.6 UJ | 1.6 UJ | 1.6 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U |
| 4-Nitrophenol | µg/l | 2 U | 2 U | 2 U | 2 U | 2 UJ | 2 UJ | 2 UJ | 2 U | 2 U | 2 UJ | 2 U | 2 U |
| Acenaphthene | µg/l | 3.6 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.34 J | 0.29 J | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 1.4 |
| Acenaphthylene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Acetophenone | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| Anthracene | µg/l | 1.6 J | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.073 J | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Atrazine | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| Benzaldehyde | µg/l | 2 U | 2 U | 2 U | 2 U | 2 UJ | 2 UJ | 2 UJ | 2 U | 2 U | 2 UJ | 2 U | 2 U |
| Benzo(a)Anthracene | µg/l | 0.55 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Benzo(a)Pyrene | µg/l | 0.34 J | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U |
| Benzo(b)Fluoranthene | µg/l | 0.32 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Benzo(g,h,i)Perylene | µg/l | 0.14 J | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Benzo(k)Fluoranthene | µg/l | 0.17 J | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Benzyl Butyl Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Caprolactam | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Carbazole | µg/l | 9.1 J | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 7.2 J |
| Chrysene | µg/l | 0.33 J | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| m & p Cresol | µg/l | 25 | 2 U | 2 U | 2 U | 2 UJ | 0.76 J | 0.77 J | 2 U | 2 U | 2 UJ | 2 U | 2 U |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Dibenzofuran | µg/l | 3.6 | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.67 J | 0.62 J | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 1.3 |
| Diethyl Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Dimethyl Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Di-N-Butylphthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Di-N-Octylphthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 UJ | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U |
| Fluoranthene | µg/l | 2 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Fluorene | µg/l | 3.9 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.59 J | 0.55 J | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 1 |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| Hexachlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| Hexachlorocyclopentadiene | µg/l | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 U | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 U | 3.2 U | 3.2 UJ | 3.2 U | 3.2 UJ |
| Hexachloroethane | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.13 J | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 UJ | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| Isophorone | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| Naphthalene | µg/l | 61 | 0.22 | 0.16 U | 0.16 U | 0.16 UJ | 58 | 51 | 0.12 J | 0.16 U | 0.16 UJ | 0.16 U | 38 |
| Nitrobenzene | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ | 0.8 UJ | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U |
| N-Nitrosodiphenylamine | µg/l | 0.92 U | 0.92 U | 0.92 U | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 UJ | 0.92 U |
| Total High Molecular Weight PAHs | µg/l | 5.58 | 0 U | 0 U | 0 U | 0 U | 0.14 | 0.14 | 0 U | 0 U | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 76.9 | 0.22 | 0 U | 0 U | 0 U | 59.513 | 52.36 | 0.12 | 0 U | 0 U | 0 U | 41.03 |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW1 | DPW10 | DPW11 | DPW12 | DPW13 | DPW14 | DPW14 | DPW15 | DPW16 | DPW16 | DPW17 | DPW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW01-00-3039 | CDL-DPW10-00-1726 | CDL-DPW11-00-2130 | CDL-DPW12-00-2332 | CDL-DPW13-00-3544 | CDL-DPW14-00-3140 | CDL-DPW14-01-3140 | CDL-DPW15-00-3140 | CDL-DPW16-00-2130 | CDL-DPW16-01-2130 | CDL-DPW17-00-1928 | CDL-DPW02-00-2130 |
| Sample Type | | N | N | N | N | N | N | FD | N | N | FD | N | N |
| Parent Sample # | | | | | | | | CDL-DPW14-00-3140 | | | CDL-DPW16-00-2130 | | |
| Sample Date | | 7/21/2015 | 7/21/2015 | 7/27/2015 | 5/6/2016 | 5/4/2016 | 5/5/2016 | 5/5/2016 | 5/5/2016 | 5/4/2016 | 5/4/2016 | 5/10/2016 | 7/22/2015 |
| Start Depth | | 14.5 | 8 | 10 | 11 | 17 | 10 | 10 | 15 | 10 | 10 | 9 | 10 |
| End Depth | | 19.5 | 13 | 15 | 16 | 22 | 15 | 15 | 20 | 15 | 15 | 11 | 15 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | |
| Pentachlorophenol | µg/l | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 UJ | 1.5 UJ | 1.5 UJ | 1.5 U | 1.5 U | 1.5 UJ | 1.5 U | 1.5 U |
| Phenanthrene | µg/l | 6.8 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.51 J | 0.52 J | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.63 |
| Phenol | µg/l | 3.6 | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ | 0.4 UJ | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 19 |
| Pyrene | µg/l | 1.6 | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.14 J | 0.14 J | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U |
| **Dioxins/Furans** | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,4,6,7,8-HPCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,4,7,8,9-HPCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,4,7,8-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,6,7,8-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,7,8,9-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 2,3,4,6,7,8-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 2,3,4,7,8-PECDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 36.4 U | 35.9 U | 37.5 U | 36.1 U | NA |
| 2,3,7,8-TCDD | pg/l | NA | NA | NA | NA | NA | NA | NA | 7.26 U | 7.15 U | 7.48 U | 7.21 U | NA |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | NA | NA | NA | NA | NA | NA | NA | 7.26 U | 7.15 U | 7.48 U | 7.21 U | NA |
| OCDD | pg/l | NA | NA | NA | NA | NA | NA | NA | 47.4 J | 150 | 74.8 U | 37.4 J | NA |
| OCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | 72.6 U | 71.5 U | 74.8 U | 72.1 U | NA |
| Total TEQ (WHO 2005) ND = 0 | pg/l | NA | NA | NA | NA | NA | NA | NA | 0.0142 | 0.0451 | 0 U | 0.0112 | NA |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | NA | NA | NA | NA | NA | NA | NA | 20.7 | 20.5 | 21.3 | 20.6 | NA |
| **Inorganics** | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.0055 J | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.0022 J | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U |
| Barium | mg/l | 0.036 | 0.01 J | 0.15 | 0.019 J | 0.023 J | 0.0086 J | 0.024 J | 0.019 J | 0.0076 J | 0.008 J | 0.038 | 0.05 |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U |
| Calcium | mg/l | 14 | 20 | 100 | 30 | 32 | 17 | 19 | 30 | 20 | 21 | 53 | 55 |
| Chromium | mg/l | 0.005 U | 0.005 U | 0.0018 J | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Cobalt | mg/l | 0.013 U | 0.013 U | 0.0017 J | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.0013 J | 0.013 U |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.0021 J | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Iron | mg/l | 12 | 0.19 | 0.12 | 0.065 J | 1 | 6.3 | 6.4 | 0.08 U | 0.08 U | 0.08 U | 1.4 | 4.1 |
| Lead | mg/l | 0.0062 J | 0.009 U | 0.009 U | 0.009 U | 0.0055 J | 0.0087 J | 0.0073 J | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U |
| Magnesium | mg/l | 1.8 J | 1.2 J | 7.5 | 1.4 J | 1.5 J | 1.2 J | 1.3 J | 1.5 J | 5.9 | 6.4 | 2.9 J | 8.9 |
| Manganese | mg/l | 0.59 | 0.083 | 3.2 | 0.041 | 0.12 | 0.029 | 0.037 | 0.03 | 0.12 | 0.13 | 0.28 | 1.6 |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 7.8E-05 J | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.0029 J | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.0094 J |
| Potassium | mg/l | 2.6 J | 1.1 J | 3.9 J | 0.62 J | 1.6 J | 1.2 J | 1.2 J | 0.71 J | 1.7 J | 1.8 J | 2.1 J | 6 |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 6.3 | 9.5 | 9.9 | 5 | 5.3 | 5.5 | 5.7 | 6 | 5 | 5.4 | 6 | 13 |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Zinc | mg/l | 0.01 U | 0.13 | 0.0064 J | 0.01 U | 0.0036 J | 0.01 U | 0.01 U | 0.01 U | 0.051 | 0.053 | 0.0096 J | 0.028 J |

**Notes:**
FD = field duplicate
ft btic = feet below top of inner casing
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW3 | DPW3 | DPW4 | DPW4 | DPW5 | DPW6 | DPW7 | DPW8 | DPW8 | DPW9 | DTW1 | DTW1 | DTW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW03-00-1120 | CDL-DPW03-01-1120 | CDL-DPW04-00-1928 | CDL-DPW04-01-1928 | CDL-DPW05-00-2736 | CDL-DPW06-00-1130 | CDL-DPW07-1130 | CDL-DPW08-00-1130 | CDL-DPW08-01-1130 | CDL-DPW09-00-4150 | CDL-DTW1-00-119128 | CDL-DTW1-01-119128 | CDL-DTW2-00-107116 |
| Sample Type | | N | FD | N | FD | N | N | N | N | FD | N | N | FD | N |
| Parent Sample # | | | CDL-DPW03-00-1120 | | CDL-DPW04-00-1928 | | | | | CDL-DPW08-00-1130 | | | CDL-DTW1-00-119128 | |
| Sample Date | | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/23/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/23/2015 | 8/19/2016 | 8/19/2016 | 8/26/2016 |
| Start Depth | | 5 | 5 | 9 | 9 | 13 | 5 | 5 | 5 | 5 | 20 | 59 | 59 | 52 |
| End Depth | | 10 | 10 | 14 | 14 | 18 | 15 | 15 | 15 | 15 | 25 | 64 | 64 | 57 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichloroethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1-Dichloroethene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2,4-Trichlorobenzene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromoethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichlorobenzene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloroethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloropropane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,3-Dichlorobenzene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,4-Dichlorobenzene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 2-Butanone (MEK) | µg/l | 200 U | 200 U | 4 U | 4 U | 80 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 U | 4 U |
| 2-Hexanone | µg/l | 200 U | 200 U | 4 U | 4 U | 80 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 U | 4 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 200 U | 200 U | 4 U | 4 U | 80 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 U | 4 U |
| Acetone | µg/l | 200 U | 200 U | 4 U | 4 U | 80 U | 4 U | 6.3 J | 4 U | NA | 2.4 J | 4 U | 4 U | 4 U |
| Benzene | µg/l | 160 | 110 | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.89 J | 0.77 J | 0.8 U |
| Bromodichloromethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromoform | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromomethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Disulfide | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.44 J |
| Carbon Tetrachloride | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chlorobenzene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroform | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.72 J |
| Chloromethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,2-Dichloroethene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,3-Dichloropropene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Cyclohexane | µg/l | 290 | 300 | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dibromochloromethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dichlorodifluoromethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Ethylbenzene | µg/l | 1300 | 1300 | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 2.9 | 3.1 | 0.8 U |
| Isopropylbenzene | µg/l | 91 | 86 | 0.8 U | 0.8 U | 7.1 J | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.47 J | 0.5 J | 0.8 U |
| Methyl Acetate | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Tert-Butyl Ether | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylcylohexane | µg/l | 110 J | 100 J | 0.8 U | 0.8 U | 100 | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 12 | 13 | 0.8 U |
| Methylene Chloride | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Styrene | µg/l | 9.5 J | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 UJ | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Tetrachloroethene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Toluene | µg/l | 390 J | 550 J | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 6.6 | 6.5 | 0.8 U |
| trans-1,2-Dichloroethene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,3-Dichloropropene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichloroethene | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichlorofluoromethane | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Vinyl Chloride | µg/l | 40 U | 40 U | 0.8 U | 0.8 U | 16 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Xylenes (Total) | µg/l | 4800 | 4500 | 0.8 U | 0.8 U | 40 | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 14 | 15 | 0.8 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 5.5 | 5.4 | 0.4 U | 0.4 U | 1.1 | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2,4,5-Trichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2,4,6-Trichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2,4-Dichlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2,4-Dimethylphenol | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| 2,4-Dinitrophenol | µg/l | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | NA | 3.2 U | 3.2 UJ | 3.2 UJ | 3.2 UJ |
| 2,4-Dinitrotoluene | µg/l | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | NA | 1 U | 1 U | 1 UJ | 1 UJ |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW3 | DPW3 | DPW4 | DPW4 | DPW5 | DPW6 | DPW7 | DPW8 | DPW8 | DPW9 | DTW1 | DTW1 | DTW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW03-00-1120 | CDL-DPW03-01-1120 | CDL-DPW04-00-1928 | CDL-DPW04-01-1928 | CDL-DPW05-00-2736 | CDL-DPW06-00-1130 | CDL-DPW07-1130 | CDL-DPW08-00-1130 | CDL-DPW08-01-1130 | CDL-DPW09-00-4150 | CDL-DTW1-00-119128 | CDL-DTW1-01-119128 | CDL-DTW2-00-107116 |
| Sample Type | | N | FD | N | FD | N | N | N | N | FD | N | N | FD | N |
| Parent Sample # | | | CDL-DPW03-00-1120 | | CDL-DPW04-00-1928 | | | | | CDL-DPW08-00-1130 | | | CDL-DTW1-00-119128 | |
| Sample Date | | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/23/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/23/2015 | 8/19/2016 | 8/19/2016 | 8/26/2016 |
| Start Depth | | 5 | 5 | 9 | 9 | 13 | 5 | 5 | 5 | 5 | 20 | 59 | 59 | 52 |
| End Depth | | 10 | 10 | 14 | 14 | 18 | 15 | 15 | 15 | 15 | 25 | 64 | 64 | 57 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | µg/l | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | NA | 1 U | 1 U | 1 UJ | 1 UJ |
| 2-Chloronaphthalene | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2-Chlorophenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2-Methylnaphthalene | µg/l | 68 | 71 | 0.1 U | 0.1 U | 12 | 0.1 U | 0.1 U | 0.1 U | NA | 0.1 U | 1.6 | 1.5 J | 0.1 UJ |
| 2-Methylphenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 2-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | NA | 1.6 U | 1.6 U | 1.6 UJ | 1.6 UJ |
| 2-Nitrophenol | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| 3,3'-Dichlorobenzidine | µg/l | 2 U | 2 U | 2 U | 2 U | 2 UJ | 2 U | 2 R | 2 UJ | NA | 2 U | 2 U | 2 UJ | 2 UJ |
| 3-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | NA | 1.6 U | 1.6 U | 1.6 UJ | 1.6 UJ |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 UJ | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| 4-Chloroaniline | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| 4-Nitroaniline | µg/l | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | NA | 1.6 U | 1.6 U | 1.6 UJ | 1.6 UJ |
| 4-Nitrophenol | µg/l | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | NA | 2 U | 2 U | 2 UJ | 2 UJ |
| Acenaphthene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.18 J | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.21 | 0.19 J | 0.16 UJ |
| Acenaphthylene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Acetophenone | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.073 J | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Atrazine | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| Benzaldehyde | µg/l | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | NA | 2 U | 2 U | 2 UJ | 2 UJ |
| Benzo(a)Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.13 J | 0.16 U | 0.19 J | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Benzo(a)Pyrene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.088 J | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Benzo(b)Fluoranthene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.11 J | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Benzo(g,h,i)Perylene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Benzo(k)Fluoranthene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Benzyl Butyl Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 UJ | NA | 4 U | 1 J | 0.44 J | 4 UJ |
| Caprolactam | µg/l | 4 U | 4 U | 4 U | 4 U | 1.3 J | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| Carbazole | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| Chrysene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| m & p Cresol | µg/l | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | NA | 2 U | 0.51 J | 2 UJ | 2 UJ |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Dibenzofuran | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.32 J | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.19 J | 0.4 UJ | 0.4 UJ |
| Diethyl Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| Dimethyl Phthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| Di-N-Butylphthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| Di-N-Octylphthalate | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 4 U | 4 U | 4 UJ | 4 UJ |
| Fluoranthene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 J | 0.16 U | NA | 0.16 U | 0.1 J | 0.16 UJ | 0.16 UJ |
| Fluorene | µg/l | 1.4 J | 0.16 U | 0.16 U | 0.16 U | 0.39 | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.23 J | 0.16 UJ |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| Hexachlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| Hexachlorocyclopentadiene | µg/l | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | 3.2 UJ | NA | 3.2 UJ | 3.2 U | 3.2 UJ | 3.2 UJ |
| Hexachloroethane | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | NA | 0.16 U | 0.16 U | 0.16 UJ | 0.16 UJ |
| Isophorone | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| Naphthalene | µg/l | 120 | 120 | 0.16 U | 0.16 U | 5.3 | 0.53 | 0.16 U | 0.16 U | NA | 0.16 U | 1.7 | 1.7 J | 0.16 UJ |
| Nitrobenzene | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 0.8 U | 0.8 U | 0.8 UJ | 0.8 UJ |
| N-Nitrosodiphenylamine | µg/l | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | NA | 0.92 U | 0.92 U | 0.92 UJ | 0.92 UJ |
| Total High Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0 U | 0.13 | 0 U | 0.678 | 0 U | NA | 0 U | 0.193 | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 121.4 | 120 | 0 U | 0 U | 6.183 | 0.53 | 0.075 | 0 U | NA | 0 U | 2.48 | 2.59 | 0 U |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW3 | DPW3 | DPW4 | DPW4 | DPW5 | DPW6 | DPW7 | DPW8 | DPW8 | DPW9 | DTW1 | DTW1 | DTW2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW03-00-1120 | CDL-DPW03-01-1120 | CDL-DPW04-00-1928 | CDL-DPW04-01-1928 | CDL-DPW05-00-2736 | CDL-DPW06-00-1130 | CDL-DPW07-1130 | CDL-DPW08-00-1130 | CDL-DPW08-01-1130 | CDL-DPW09-00-4150 | CDL-DTW1-00-119128 | CDL-DTW1-01-119128 | CDL-DTW2-00-107116 |
| Sample Type | | N | FD | N | FD | N | N | N | N | FD | N | N | FD | N |
| Parent Sample # | | | CDL-DPW03-00-1120 | | CDL-DPW04-00-1928 | | | | | CDL-DPW08-00-1130 | | | CDL-DTW1-00-119128 | |
| Sample Date | | 7/22/2015 | 7/22/2015 | 7/23/2015 | 7/23/2015 | 7/24/2015 | 7/23/2015 | 7/27/2015 | 7/23/2015 | 7/23/2015 | 7/23/2015 | 8/19/2016 | 8/19/2016 | 8/26/2016 |
| Start Depth | | 5 | 5 | 9 | 9 | 13 | 5 | 5 | 5 | 5 | 20 | 59 | 59 | 52 |
| End Depth | | 10 | 10 | 14 | 14 | 18 | 15 | 15 | 15 | 15 | 25 | 64 | 64 | 57 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | |
| Pentachlorophenol | µg/l | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | NA | 1.5 U | 1.5 U | 1.5 UJ | 1.5 UJ |
| Phenanthrene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.24 | 0.16 U | 0.075 J | 0.16 U | NA | 0.16 U | 0.57 | 0.47 J | 0.16 UJ |
| Phenol | µg/l | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | NA | 0.4 U | 0.4 U | 0.4 UJ | 0.4 UJ |
| Pyrene | µg/l | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.13 J | 0.16 U | NA | 0.16 U | 0.093 J | 0.16 UJ | 0.16 UJ |
| **Dioxins/Furans** | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 71.4 |
| 1,2,3,4,6,7,8-HPCDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 41.2 J |
| 1,2,3,4,7,8,9-HPCDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,4,7,8-HXCDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,6,7,8-HXCDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,7,8,9-HXCDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 2,3,4,6,7,8-HXCDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 2,3,4,7,8-PECDF | pg/l | NA | NA | 34.8 U | NA | NA | NA | NA | 36.7 U | 36.8 U | NA | 34.7 U | 35.2 U | 36.5 U |
| 2,3,7,8-TCDD | pg/l | NA | NA | 6.94 U | NA | NA | NA | NA | 7.33 U | 7.34 U | NA | 6.91 U | 7.01 U | 7.28 U |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | NA | NA | 6.94 UJ | NA | NA | NA | NA | 7.33 UJ | 7.34 UJ | NA | 6.91 U | 7.01 U | 4 J |
| OCDD | pg/l | NA | NA | 140 J | NA | NA | NA | NA | 206 | 177 | NA | 95.2 J | 441 | 1470 J |
| OCDF | pg/l | NA | NA | 69.4 U | NA | NA | NA | NA | 73.3 U | 73.4 U | NA | 69.1 U | 70.1 U | 58.6 J |
| Total TEQ (WHO 2005) ND = 0 | pg/l | NA | NA | 0.042 | NA | NA | NA | NA | 0.0619 | 0.0531 | NA | 0.0286 | 0.132 | 1.98 |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | NA | NA | 19.9 | NA | NA | NA | NA | 21 | 21 | NA | 19.8 | 20.1 | 22.4 |
| **Inorganics** | | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | NA | 0.2 U | 0.2 U | 0.2 U | 0.2 U |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | NA | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.0043 J | 0.0028 J | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | NA | 0.008 U | 0.008 U | 0.008 U | 0.0022 J |
| Barium | mg/l | 0.032 | 0.034 | 0.005 J | 0.005 J | 0.0084 J | 0.0086 J | 0.19 | 0.017 J | NA | 0.012 J | 0.041 | 0.036 | 0.025 |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | NA | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U |
| Calcium | mg/l | 27 | 30 | 25 | 24 | 18 | 25 | 49 | 35 | NA | 44 | 18 | 16 | 12 |
| Chromium | mg/l | 0.00081 J | 0.00078 J | 0.019 | 0.021 | 0.005 U | 0.005 U | 0.005 U | 0.005 U | NA | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Cobalt | mg/l | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.0016 J | 0.013 U | NA | 0.013 U | 0.011 J | 0.0096 J | 0.0037 J |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | NA | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Iron | mg/l | 37 | 32 | 0.08 U | 0.08 U | 2 | 0.08 U | 0.08 U | 0.08 U | NA | 0.87 | 9.8 | 8.6 | 0.34 |
| Lead | mg/l | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | NA | 0.009 U | 0.009 U | 0.009 U | 0.009 U |
| Magnesium | mg/l | 1.8 J | 1.9 J | 1.1 J | 1.1 J | 0.85 J | 1.7 J | 12 | 4.7 J | NA | 2.1 J | 5.4 | 4.8 J | 2.5 U |
| Manganese | mg/l | 1.3 | 1.3 | 0.014 J | 0.016 | 0.028 | 0.039 | 0.64 | 0.13 | NA | 0.28 | 0.35 | 0.3 | 0.21 |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 3.2E-05 J | NA | 2.9E-05 J | 0.0001 U | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.0065 J | 0.008 U | NA | 0.0051 J | 0.021 J | 0.018 J | 0.008 U |
| Potassium | mg/l | 2.2 J | 2.4 J | 0.42 J | 0.47 J | 0.43 J | 2.4 J | 5.5 | 2.6 J | NA | 1.3 J | 2 J | 1.7 J | 2.3 J |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | NA | 0.017 U | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | NA | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 13 | 13 | 5.4 | 5.8 | 3.8 J | 4.7 J | 23 | 11 | NA | 6 | 12 | 11 | 13 |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | NA | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | NA | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Zinc | mg/l | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.13 | 0.01 U | NA | 0.08 | 0.035 | 0.032 | 0.01 U |

**Notes:**
FD = field duplicate
ft btic = feet below top of inner casing
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DTW3 | DTW4 | MW-1 | MW-1 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-4 | MW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DTW3-00-097106 | CDL-DTW4-00-101110 | CDL-MW1-00-047066 | CDL-MW1-00-047066-02 | CDL-MW2-00-029048 | CDL-MW2-00-029048-02 | CDL-MW3-00-007026 | CDL-MW3-00-007026-02 | CDL-MW3-01-007026-02 | CDL-MW4-00-009028 | CDL-MW4-00-009028-02 |
| Sample Type | | N | N | N | N | N | N | N | N | FD | N | N |
| Parent Sample # | | | | | | | | | | CDL-MW3-00-007026-02 | | |
| Sample Date | | 8/26/2016 | 8/17/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| Start Depth | | 47 | 50 | 23 | 23 | 14 | 14 | 3 | 3 | 3 | 4 | 4 |
| End Depth | | 52 | 55 | 33 | 33 | 24 | 24 | 13 | 13 | 13 | 14 | 14 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,1,2-Trichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,1-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,2-Dibromoethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,2-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,2-Dichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,2-Dichloropropane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,3-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 1,4-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| 2-Butanone (MEK) | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 40 U | 200 U |
| 2-Hexanone | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 40 U | 200 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 3.6 J | 200 U |
| Acetone | µg/l | 4 U | 4.3 J | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | NA | 40 U | 200 U |
| Benzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Bromodichloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Bromoform | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Bromomethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Carbon Disulfide | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Carbon Tetrachloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Chlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Chloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Chloroform | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Chloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| cis-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 22 | 22 J |
| cis-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Cyclohexane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 180 | 330 |
| Dibromochloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Dichlorodifluoromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Ethylbenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 430 | 580 |
| Isopropylbenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 56 J | 80 |
| Methyl Acetate | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Methyl Tert-Butyl Ether | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Methylcylohexane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 99 | 200 J |
| Methylene Chloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Styrene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Tetrachloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 3.8 J | 40 U |
| Toluene | µg/l | 0.8 U | 150 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 670 J | 540 |
| trans-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| trans-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Trichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Trichlorofluoromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Vinyl Chloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 8 U | 40 U |
| Xylenes (Total) | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | NA | 2500 | 3400 |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 2.8 | 3.3 J |
| 2,4,5-Trichlorophenol | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 2,4,6-Trichlorophenol | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 2,4-Dichlorophenol | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 2,4-Dimethylphenol | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| 2,4-Dinitrophenol | µg/l | 3.6 U | 3.2 UJ | 3.2 U | 3.2 U | 3.2 U | 3.2 UJ | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 32 U |
| 2,4-Dinitrotoluene | µg/l | 1.1 U | 1 U | 1 U | 1 U | 1 U | 1 UJ | 1 U | 1 U | 1 U | 1 U | 10 U |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DTW3 | DTW4 | MW-1 | MW-1 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-4 | MW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DTW3-00-097106 | CDL-DTW4-00-101110 | CDL-MW1-00-047066 | CDL-MW1-00-047066-02 | CDL-MW2-00-029048 | CDL-MW2-00-029048-02 | CDL-MW3-00-007026 | CDL-MW3-00-007026-02 | CDL-MW3-01-007026-02 | CDL-MW4-00-009028 | CDL-MW4-00-009028-02 |
| Sample Type | | N | N | N | N | N | N | N | N | FD | N | N |
| Parent Sample # | | | | | | | | | | CDL-MW3-00-007026-02 | | |
| Sample Date | | 8/26/2016 | 8/17/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| Start Depth | | 47 | 50 | 23 | 23 | 14 | 14 | 3 | 3 | 3 | 4 | 4 |
| End Depth | | 52 | 55 | 33 | 33 | 24 | 24 | 13 | 13 | 13 | 14 | 14 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | |
| 2,6-Dinitrotoluene | µg/l | 1.1 U | 1 U | 1 U | 1 U | 1 U | 1 UJ | 1 U | 1 U | 1 U | 1 U | 10 U |
| 2-Chloronaphthalene | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 2-Chlorophenol | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 2-Methylnaphthalene | µg/l | 0.11 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 UJ | 0.08 J | 0.1 U | 0.1 U | 39 | 59 |
| 2-Methylphenol | µg/l | 0.44 U | 0.63 J | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 2-Nitroaniline | µg/l | 1.8 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 16 U |
| 2-Nitrophenol | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| 3,3'-Dichlorobenzidine | µg/l | 2.2 UJ | 2 R | 2 U | 2 U | 2 U | 2 UJ | 2 U | 2 U | 2 U | 2 U | 20 U |
| 3-Nitroaniline | µg/l | 1.8 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 16 U |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4.5 U | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 40 U |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 4-Chloro-3-Methylphenol | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| 4-Chloroaniline | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| 4-Nitroaniline | µg/l | 1.8 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 16 U |
| 4-Nitrophenol | µg/l | 2.2 U | 2 U | 2 U | 2 U | 2 U | 2 UJ | 2 U | 2 U | 2 U | 2 U | 20 U |
| Acenaphthene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.32 | 1.6 U |
| Acenaphthylene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Acetophenone | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| Anthracene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Atrazine | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Benzaldehyde | µg/l | 2.2 U | 2 U | 2 U | 2 U | 2 U | 2 UJ | 2 U | 2 U | 2 U | 2 U | 20 U |
| Benzo(a)Anthracene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Benzo(a)Pyrene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ | 0.16 UJ | 0.16 U | 1.6 UJ |
| Benzo(b)Fluoranthene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Benzo(g,h,i)Perylene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Benzo(k)Fluoranthene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Benzyl Butyl Phthalate | µg/l | 4.5 U | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 40 U |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Bis(2-Chloroethyl) Ether | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4.5 U | 0.7 J | 4 U | 4 UJ | 4 U | 4 UJ | 4 U | 4 UJ | 4 UJ | 4 U | 40 UJ |
| Caprolactam | µg/l | 4.5 U | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 40 U |
| Carbazole | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| Chrysene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| m & p Cresol | µg/l | 2.2 U | 1.2 J | 2 U | 2 U | 2 U | 2 UJ | 2 U | 2 U | 2 U | 3.3 | 20 U |
| Dibenzo(a,h)Anthracene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Dibenzofuran | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Diethyl Phthalate | µg/l | 4.5 U | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 40 U |
| Dimethyl Phthalate | µg/l | 4.5 U | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 40 U |
| Di-N-Butylphthalate | µg/l | 4.5 U | 4 U | 4 U | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 40 U |
| Di-N-Octylphthalate | µg/l | 4.5 U | 4 U | 4 U | 4 UJ | 4 U | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 40 UJ |
| Fluoranthene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Fluorene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.44 | 1.6 U |
| Hexachloro-1,3-Butadiene | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Hexachlorobenzene | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| Hexachlorocyclopentadiene | µg/l | 3.6 U | 3.2 U | 3.2 U | 3.2 UJ | 3.2 U | 3.2 UJ | 3.2 U | 3.2 UJ | 3.2 UJ | 3.2 U | 32 UJ |
| Hexachloroethane | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| Isophorone | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| Naphthalene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.083 J | 0.16 U | 0.16 UJ | 0.19 J | 0.16 U | 0.16 U | 72 | 110 |
| Nitrobenzene | µg/l | 0.44 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.88 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 8 U |
| N-Nitrosodiphenylamine | µg/l | 1 U | 0.92 R | 0.92 U | 0.92 U | 0.92 U | 0.92 UJ | 0.92 UJ | 0.92 U | 0.92 U | 0.92 U | 9.2 U |
| Total High Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0.083 | 0 U | 0 U | 0.19 | 0 U | 0 U | 72.91 | 110 |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DTW3 | DTW4 | MW-1 | MW-1 | MW-2 | MW-2 | MW-3 | MW-3 | MW-3 | MW-4 | MW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DTW3-00-097106 | CDL-DTW4-00-101110 | CDL-MW1-00-047066 | CDL-MW1-00-047066-02 | CDL-MW2-00-029048 | CDL-MW2-00-029048-02 | CDL-MW3-00-007026 | CDL-MW3-00-007026-02 | CDL-MW3-01-007026-02 | CDL-MW4-00-009028 | CDL-MW4-00-009028-02 |
| Sample Type | | N | N | N | N | N | N | N | N | FD | N | N |
| Parent Sample # | | | | | | | | | | CDL-MW3-00-007026-02 | | |
| Sample Date | | 8/26/2016 | 8/17/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| Start Depth | | 47 | 50 | 23 | 23 | 14 | 14 | 3 | 3 | 3 | 4 | 4 |
| End Depth | | 52 | 55 | 33 | 33 | 24 | 24 | 13 | 13 | 13 | 14 | 14 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | |
| Pentachlorophenol | µg/l | 1.7 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 UJ | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 15 U |
| Phenanthrene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.15 J | 1.6 U |
| Phenol | µg/l | 0.44 U | 13 | 0.4 U | 0.4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 4 U |
| Pyrene | µg/l | 0.18 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 1.6 U |
| **Dioxins/Furans** | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,4,7,8-HXCDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,6,7,8-HXCDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,7,8,9-HXCDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 2,3,4,6,7,8-HXCDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 2,3,4,7,8-PECDF | pg/l | 38 U | 37.9 U | NA | 34.6 U | NA | 34.1 U | 36.8 U | 34.7 U | NA | 36 U | 36.5 U |
| 2,3,7,8-TCDD | pg/l | 7.57 U | 7.56 U | NA | 6.89 UJ | NA | 6.8 UJ | 7.34 UJ | 6.92 UJ | NA | 7.18 U | 7.27 UJ |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 7.57 U | 7.56 U | NA | 6.89 UJ | NA | 6.8 UJ | 7.34 UJ | 6.92 UJ | NA | 7.18 UJ | 7.27 UJ |
| OCDD | pg/l | 75.7 U | 75.6 U | NA | 68.9 U | NA | 354 | 338 | 458 | NA | 136 | 166 |
| OCDF | pg/l | 75.7 U | 75.6 U | NA | 68.9 U | NA | 68 U | 73.4 U | 69.2 U | NA | 71.8 U | 72.7 U |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0 U | 0 U | NA | 0 U | NA | 0.106 | 0.101 | 0.137 | NA | 0.0407 | 0.0498 |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 21.6 | 21.6 | NA | 19.7 | NA | 19.5 | 21 | 19.9 | NA | 20.5 | 20.8 |
| **Inorganics** | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 1.3 | 1.6 | 12 | 3.2 | 0.97 | 7.3 | 8.2 | 0.2 U | 0.2 U |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.008 U | 0.008 U | 0.0039 J | 0.003 J | 0.0039 J | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.0044 J | 0.0058 J |
| Barium | mg/l | 0.018 J | 0.027 | 0.009 J | 0.012 J | 0.044 | 0.021 J | 0.0048 J | 0.02 J | 0.023 J | 0.025 | 0.013 J |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0007 J | 0.0025 U | 0.0006 J |
| Calcium | mg/l | 12 | 20 | 27 | 28 | 21 | 17 | 23 | 21 | 21 | 31 | 19 |
| Chromium | mg/l | 0.005 U | 0.005 U | 0.0037 J | 0.005 U | 0.015 | 0.0056 J | 0.0017 J | 0.005 U | 0.0094 J | 0.0017 J | 0.005 U |
| Cobalt | mg/l | 0.0023 J | 0.011 J | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.0036 J | 0.0028 J | 0.0027 J | 0.045 | 0.051 | 0.005 U | 0.005 U |
| Iron | mg/l | 0.1 | 8 | 0.68 | 0.84 | 3.2 | 1.4 | 0.49 | 3.7 | 4.3 | 15 | 13 |
| Lead | mg/l | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.005 J | 0.0056 J | 0.0054 J |
| Magnesium | mg/l | 2.5 U | 6.4 | 1.5 J | 2 J | 2 J | 1.4 J | 2.8 J | 2.5 J | 2.5 J | 1.6 J | 1.5 J |
| Manganese | mg/l | 0.082 | 0.63 | 0.0075 J | 0.008 J | 0.02 | 0.011 J | 0.0039 J | 0.018 | 0.021 | 0.22 | 0.19 |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 3.9E-05 J | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.0091 J | 0.008 U | 0.008 U | 0.0056 J | 0.0028 J | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U |
| Potassium | mg/l | 1 J | 2.8 J | 1 J | 1.3 J | 1.6 J | 1.6 J | 1.1 J | 1.5 J | 1.5 J | 1.5 J | 1.2 J |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 10 | 13 | 4.4 J | 5.1 | 4.5 J | 4.5 J | 6 | 5.2 | 5.3 | 30 | 26 |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.0067 J | 0.0026 J | 0.025 U | 0.0073 J | 0.0077 J | 0.025 U | 0.025 U |
| Zinc | mg/l | 0.01 U | 0.013 J | 0.025 | 0.0092 J | 0.018 J | 0.63 | 0.0048 J | 0.01 J | 0.012 J | 0.0023 J | 0.01 U |

**Notes:**
FD = field duplicate
ft btic = feet below top of inner casing
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | MW-4 | MW-4 | MW-5 | MW-5 | MW-6 | MW-6 |
|---|---|---|---|---|---|---|---|
| Sample # | | CDL-MW4-01-009028 | CDL-MW4-01-009028-02 | CDL-MW5-00-009028 | CDL-MW5-00-009028-02 | CDL-MW6-00-023042 | CDL-MW6-00-023042-02 |
| Sample Type | | FD | FD | N | N | N | N |
| Parent Sample # | | CDL-MW4-00-009028 | CDL-MW4-00-009028-02 | | | | |
| Sample Date | | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| Start Depth | | 4 | 4 | 23 | 23 | 11 | 11 |
| End Depth | | 14 | 14 | 33 | 33 | 21 | 21 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | |
| **Volatile Organic Compounds** | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichloroethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 UJ |
| 1,1-Dichloroethene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2,4-Trichlorobenzene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromoethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichlorobenzene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloroethane | µg/l | 8 U | 40 U | 0.59 J | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloropropane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,3-Dichlorobenzene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,4-Dichlorobenzene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 2-Butanone (MEK) | µg/l | 40 U | 200 U | 4 U | 4 U | 4 U | 4 U |
| 2-Hexanone | µg/l | 40 U | 200 U | 4 U | 4 U | 4 U | 4 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 40 U | 200 U | 4 U | 4 U | 4 U | 4 U |
| Acetone | µg/l | 40 U | 200 U | 4 U | 4 U | 4 U | 4 U |
| Benzene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromodichloromethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromoform | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromomethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Disulfide | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Tetrachloride | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chlorobenzene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroethane | µg/l | 4.4 J | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroform | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloromethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,2-Dichloroethene | µg/l | 21 | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,3-Dichloropropene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Cyclohexane | µg/l | 190 | 330 | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dibromochloromethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dichlorodifluoromethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Ethylbenzene | µg/l | 450 | 600 | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Isopropylbenzene | µg/l | 60 J | 83 | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Acetate | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Tert-Butyl Ether | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylcylohexane | µg/l | 110 | 210 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylene Chloride | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Styrene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Tetrachloroethene | µg/l | 3.6 J | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Toluene | µg/l | 650 J | 570 | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,2-Dichloroethene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,3-Dichloropropene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichloroethene | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichlorofluoromethane | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Vinyl Chloride | µg/l | 8 U | 40 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Xylenes (Total) | µg/l | 2600 | 3500 | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| **Semi-Volatile Organic Compounds** | | | | | | | |
| 1,1'-Biphenyl | µg/l | 2.8 | 3.2 J | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2,4,5-Trichlorophenol | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2,4,6-Trichlorophenol | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2,4-Dichlorophenol | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2,4-Dimethylphenol | µg/l | 0.8 U | 1.9 J | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| 2,4-Dinitrophenol | µg/l | 3.2 U | 32 U | 3.2 U | 3.2 UJ | 3.2 U | 3.2 UJ |
| 2,4-Dinitrotoluene | µg/l | 1 U | 10 U | 1 U | 1 UJ | 1 U | 1 UJ |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | MW-4 | MW-4 | MW-5 | MW-5 | MW-6 | MW-6 |
|---|---|---|---|---|---|---|---|
| Sample # | | CDL-MW4-01-009028 | CDL-MW4-01-009028-02 | CDL-MW5-00-009028 | CDL-MW5-00-009028-02 | CDL-MW6-00-023042 | CDL-MW6-00-023042-02 |
| Sample Type | | FD | FD | N | N | N | N |
| Parent Sample # | | CDL-MW4-00-009028 | CDL-MW4-00-009028-02 | | | | |
| Sample Date | | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| Start Depth | | 4 | 4 | 23 | 23 | 11 | 11 |
| End Depth | | 14 | 14 | 33 | 33 | 21 | 21 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | |
| 2,6-Dinitrotoluene | µg/l | 1 U | 10 U | 1 U | 1 UJ | 1 U | 1 UJ |
| 2-Chloronaphthalene | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2-Chlorophenol | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2-Methylnaphthalene | µg/l | 48 | 57 | 0.1 U | 0.1 UJ | 0.1 U | 0.1 UJ |
| 2-Methylphenol | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 2-Nitroaniline | µg/l | 1.6 U | 16 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 UJ |
| 2-Nitrophenol | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| 3,3'-Dichlorobenzidine | µg/l | 2 U | 20 U | 2 U | 2 UJ | 2 U | 2 UJ |
| 3-Nitroaniline | µg/l | 1.6 U | 16 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 UJ |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 U | 40 U | 4 U | 4 UJ | 4 U | 4 UJ |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| 4-Chloroaniline | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| 4-Nitroaniline | µg/l | 1.6 U | 16 U | 1.6 U | 1.6 UJ | 1.6 U | 1.6 UJ |
| 4-Nitrophenol | µg/l | 2 U | 20 U | 2 U | 2 UJ | 2 U | 2 U |
| Acenaphthene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.092 J | 0.16 U | 0.16 UJ |
| Acenaphthylene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Acetophenone | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| Anthracene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.069 J | 0.16 U | 0.16 UJ |
| Atrazine | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| Benzaldehyde | µg/l | 2 U | 20 U | 2 U | 2 UJ | 2 U | 2 UJ |
| Benzo(a)Anthracene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Benzo(a)Pyrene | µg/l | 0.16 U | 1.6 UJ | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Benzo(b)Fluoranthene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.2 J | 0.16 U | 0.16 UJ |
| Benzo(g,h,i)Perylene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.047 J | 0.16 U | 0.16 UJ |
| Benzo(k)Fluoranthene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Benzyl Butyl Phthalate | µg/l | 4 U | 40 U | 4 U | 4 UJ | 4 U | 4 UJ |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 U | 40 UJ | 4 U | 4 UJ | 4 U | 4 UJ |
| Caprolactam | µg/l | 4 U | 40 U | 4 U | 4 UJ | 4 U | 4 UJ |
| Carbazole | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| Chrysene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.068 J | 0.16 U | 0.16 UJ |
| m & p Cresol | µg/l | 2.3 | 20 U | 2 U | 2 UJ | 2 U | 2 UJ |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Dibenzofuran | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| Diethyl Phthalate | µg/l | 4 U | 40 U | 4 U | 4 UJ | 4 U | 4 UJ |
| Dimethyl Phthalate | µg/l | 4 U | 40 U | 4 U | 4 UJ | 4 U | 4 UJ |
| Di-N-Butylphthalate | µg/l | 4 U | 40 U | 4 U | 4 UJ | 4 U | 4 UJ |
| Di-N-Octylphthalate | µg/l | 4 U | 40 UJ | 4 U | 4 UJ | 4 U | 4 UJ |
| Fluoranthene | µg/l | 0.16 U | 1.6 U | 0.11 J | 0.24 J | 0.16 U | 0.16 UJ |
| Fluorene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| Hexachlorobenzene | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| Hexachlorocyclopentadiene | µg/l | 3.2 U | 32 UJ | 3.2 U | 3.2 UJ | 3.2 U | 3.2 UJ |
| Hexachloroethane | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.16 UJ | 0.16 U | 0.16 UJ |
| Isophorone | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| Naphthalene | µg/l | 82 | 110 | 0.16 U | 0.063 J | 0.16 U | 0.16 UJ |
| Nitrobenzene | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 UJ |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 U | 8 U | 0.8 U | 0.8 UJ | 0.8 U | 0.8 UJ |
| N-Nitrosodiphenylamine | µg/l | 0.92 U | 9.2 U | 0.92 U | 0.92 UJ | 0.92 U | 0.92 UJ |
| Total High Molecular Weight PAHs | µg/l | 0 U | 0 U | 0.195 | 0.745 | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 82 | 110 | 0 U | 0.394 | 0 U | 0 U |

**Table C-5**
**Groundwater Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | MW-4 | MW-4 | MW-5 | MW-5 | MW-6 | MW-6 |
|---|---|---|---|---|---|---|---|
| Sample # | | CDL-MW4-01-009028 | CDL-MW4-01-009028-02 | CDL-MW5-00-009028 | CDL-MW5-00-009028-02 | CDL-MW6-00-023042 | CDL-MW6-00-023042-02 |
| Sample Type | | FD | FD | N | N | N | N |
| Parent Sample # | | CDL-MW4-00-009028 | CDL-MW4-00-009028-02 | | | | |
| Sample Date | | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 | 5/13/2016 | 11/15/2016 |
| Start Depth | | 4 | 4 | 23 | 23 | 11 | 11 |
| End Depth | | 14 | 14 | 33 | 33 | 21 | 21 |
| Depth Unit | | ft btic | ft btic | ft btic | ft btic | ft btic | ft btic |
| Analyte | Units | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | |
| Pentachlorophenol | µg/l | 1.5 U | 15 U | 1.5 U | 1.5 UJ | 1.5 U | 1.5 UJ |
| Phenanthrene | µg/l | 0.16 U | 1.6 U | 0.16 U | 0.17 J | 0.16 U | 0.16 UJ |
| Phenol | µg/l | 0.4 U | 4 U | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U |
| Pyrene | µg/l | 0.16 U | 1.6 U | 0.085 J | 0.19 J | 0.16 U | 0.16 UJ |
| **Dioxins/Furans** | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,4,7,8-HXCDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,6,7,8-HXCDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,7,8,9-HXCDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 2,3,4,6,7,8-HXCDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 2,3,4,7,8-PECDF | pg/l | 35.2 U | 36.2 U | 35.3 U | 35.9 U | NA | 34.6 U |
| 2,3,7,8-TCDD | pg/l | 7.02 U | 7.23 UJ | 7.04 U | 7.16 UJ | NA | 6.9 UJ |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 7.02 UJ | 7.23 UJ | 7.04 UJ | 7.16 UJ | NA | 6.9 UJ |
| OCDD | pg/l | 118 | 123 | 312 | 285 | NA | 378 J |
| OCDF | pg/l | 70.2 U | 72.3 U | 70.4 U | 71.6 U | NA | 69 U |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0.0353 | 0.037 | 0.0935 | 0.0855 | NA | 0.113 |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 20.1 | 20.7 | 20.2 | 20.5 | NA | 19.8 |
| **Inorganics** | | | | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 0.24 J | 55 | 9.1 | 11 |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.0057 J | 0.0038 J | 0.0068 J | 0.071 | 0.007 J | 0.0094 J |
| Barium | mg/l | 0.023 J | 0.013 J | 0.093 | 0.89 | 0.034 | 0.042 |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0025 U | 0.005 | 0.0025 U | 0.0025 U |
| Calcium | mg/l | 29 | 19 | 110 | 150 | 23 | 22 |
| Chromium | mg/l | 0.0026 J | 0.005 U | 0.005 U | 0.033 | 0.007 J | 0.005 U |
| Cobalt | mg/l | 0.013 U | 0.013 U | 0.0048 J | 0.042 | 0.0015 J | 0.0014 J |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.03 | 0.0019 J | 0.0021 J |
| Iron | mg/l | 15 | 12 | 15 | 100 | 3.7 | 4.4 |
| Lead | mg/l | 0.0058 J | 0.0052 J | 0.009 U | 0.14 | 0.009 U | 0.009 U |
| Magnesium | mg/l | 1.7 J | 1.5 J | 6.1 | 19 | 1.8 J | 2.2 J |
| Manganese | mg/l | 0.22 | 0.18 | 2.4 | 4 | 0.054 | 0.071 |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U | 0.0003 | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.008 U | 0.008 U | 0.0071 J | 0.008 U | 0.008 U |
| Potassium | mg/l | 1.4 J | 1.1 J | 0.41 J | 9.8 | 0.91 J | 1.3 J |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 30 | 26 | 39 | 35 | 5.4 | 6 |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.059 | 0.0088 J | 0.01 J |
| Zinc | mg/l | 0.01 U | 0.01 U | 0.018 J | 2.9 | 0.011 J | 0.0091 J |

**Notes:**
FD = field duplicate
ft btic = feet below top of inner casing
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
N = normal field samples
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-6**
**Aqueous Quality Control Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Sample # | | CDL-RB1-02 | CDL-RB1-02-111516 | CDL-RB1-02B | CDL-RB1-03-051016 | CDL-RB2-02 | CDL-RB2-03-051316 | CDL-RBPW1-02-082216 | CDL-RBPW2-02-082416 | CDL-RBPW3-02-082516 | CDL-RBPW4-02-082616 | CDL-RBPW5-02-082916 | CDL-RBPW6-02-083016 | CDL-RBSD1-02-082216 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB |
| Analyte | Units | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromoethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloropropane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,3-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,4-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 2-Butanone (MEK) | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 2-Hexanone | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Acetone | µg/l | 4 U | 4 U | 4 U | 4.9 J | 4 U | 5.9 J | 2.9 J | 4 U | 4 U | 4 U | 4 U | 4 U | 2.2 J |
| Benzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromodichloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromoform | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromomethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Disulfide | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Tetrachloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroform | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.23 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Cyclohexane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dibromochloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dichlorodifluoromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Ethylbenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Isopropylbenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Acetate | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Tert-Butyl Ether | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylcylohexane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylene Chloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.45 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Styrene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Tetrachloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Toluene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichlorofluoromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Vinyl Chloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Xylenes (Total) | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 2,4,5-Trichlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 2,4,6-Trichlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 2,4-Dichlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 2,4-Dimethylphenol | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 2,4-Dinitrophenol | µg/l | 3.2 U | 3.2 UJ | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 UJ | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U |
| 2,4-Dinitrotoluene | µg/l | 1 U | 1 UJ | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| 2,6-Dinitrotoluene | µg/l | 1 U | 1 UJ | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U |
| 2-Chloronaphthalene | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 2-Chlorophenol | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 2-Methylnaphthalene | µg/l | 0.1 U | 0.1 UJ | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U | 0.1 U |
| 2-Methylphenol | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |

**Table C-6**
**Aqueous Quality Control Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Sample # | | CDL-RB1-02 | CDL-RB1-02-111516 | CDL-RB1-02B | CDL-RB1-03-051016 | CDL-RB2-02 | CDL-RB2-03-051316 | CDL-RBPW1-02-082216 | CDL-RBPW2-02-082416 | CDL-RBPW3-02-082516 | CDL-RBPW4-02-082616 | CDL-RBPW5-02-082916 | CDL-RBPW6-02-083016 | CDL-RBSD1-02-082216 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB |
| Analyte | Units | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | |
| 2-Nitroaniline | µg/l | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U |
| 2-Nitrophenol | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 3,3'-Dichlorobenzidine | µg/l | 2 U | 2 UJ | 2 U | 2 U | 2 UJ | 2 U | 2 UJ | 2 UJ | 2 UJ | 2 UJ | 2 U | 2 UJ | 2 UJ |
| 3-Nitroaniline | µg/l | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 2.8 | 0.8 U | 2.8 | 1 | 0.8 U | 16 | 15 | 14 | 15 | 0.89 J |
| 4-Chloroaniline | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| 4-Nitroaniline | µg/l | 1.6 U | 1.6 UJ | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U | 1.6 U |
| 4-Nitrophenol | µg/l | 2 U | 2 UJ | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U |
| Acenaphthene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Acenaphthylene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Acetophenone | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.3 J | 0.37 J | 0.8 U |
| Anthracene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Atrazine | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Benzaldehyde | µg/l | 2 U | 2 UJ | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 0.59 J | 2 U | 0.71 J | 2 U | 2 U |
| Benzo(a)Anthracene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Benzo(a)Pyrene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Benzo(b)Fluoranthene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Benzo(g,h,i)Perylene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Benzo(k)Fluoranthene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Benzyl Butyl Phthalate | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Caprolactam | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Carbazole | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chrysene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| m & p Cresol | µg/l | 2 U | 2 UJ | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U | 2 U |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Dibenzofuran | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Diethyl Phthalate | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 7.1 | 6.6 | 5.8 | 6.1 | 4 U |
| Dimethyl Phthalate | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Di-N-Butylphthalate | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Di-N-Octylphthalate | µg/l | 4 U | 4 UJ | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Fluoranthene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Fluorene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Hexachlorobenzene | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Hexachlorocyclopentadiene | µg/l | 3.2 U | 3.2 UJ | 3.2 UJ | 3.2 U | 3.2 UJ | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U | 3.2 U |
| Hexachloroethane | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Isophorone | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Naphthalene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Nitrobenzene | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 U | 0.8 UJ | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| N-Nitrosodiphenylamine | µg/l | 0.92 U | 0.92 UJ | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U | 0.92 U |
| Total High Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Total Low Molecular Weight PAHs | µg/l | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Pentachlorophenol | µg/l | 1.5 U | 1.5 UJ | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U | 1.5 U |
| Phenanthrene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| Phenol | µg/l | 0.4 U | 0.4 UJ | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U | 0.4 U |
| Pyrene | µg/l | 0.16 U | 0.16 UJ | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U | 0.16 U |
| **Dioxins/Furans** | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,4,7,8-HXCDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |

**Table C-6**
**Aqueous Quality Control Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Sample # | | CDL-RB1-02 | CDL-RB1-02-111516 | CDL-RB1-02B | CDL-RB1-03-051016 | CDL-RB2-02 | CDL-RB2-03-051316 | CDL-RBPW1-02-082216 | CDL-RBPW2-02-082416 | CDL-RBPW3-02-082516 | CDL-RBPW4-02-082616 | CDL-RBPW5-02-082916 | CDL-RBPW6-02-083016 | CDL-RBSD1-02-082216 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB | RB |
| Analyte | Units | | | | | | | | | | | | | |
| **Dioxins/Furans Continued** | | | | | | | | | | | | | | |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,6,7,8-HXCDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,7,8,9-HXCDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 2,3,4,6,7,8-HXCDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 2,3,4,7,8-PECDF | pg/l | 35.9 U | 34.3 U | NA | 36.7 U | 36.1 U | 35.5 U | 34.3 U | 34.8 U | 37.2 U | 36.4 U | 35 U | 34.9 U | 34 U |
| 2,3,7,8-TCDD | pg/l | 7.16 U | 6.84 UJ | NA | 7.31 U | 7.2 U | 7.07 U | 6.84 U | 6.94 U | 7.41 U | 7.26 U | 6.98 U | 6.95 U | 6.78 U |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 7.16 UJ | 6.84 UJ | NA | 7.31 U | 7.2 U | 7.07 UJ | 6.84 U | 6.94 U | 7.41 U | 7.26 U | 6.98 U | 6.95 U | 6.78 U |
| OCDD | pg/l | 71.6 UJ | 68.4 U | NA | 73.1 U | 72 U | 70.7 U | 68.4 U | 69.4 U | 74.1 U | 72.6 U | 69.8 U | 69.5 U | 67.8 U |
| OCDF | pg/l | 71.6 U | 68.4 U | NA | 73.1 U | 72 U | 70.7 U | 68.4 U | 69.4 U | 74.1 U | 72.6 U | 69.8 U | 69.5 U | 67.8 U |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0 U | 0 U | NA | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U | 0 U |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 20.4 | 19.5 | NA | 20.9 | 20.6 | 20.2 | 19.5 | 19.8 | 21.2 | 20.7 | 19.9 | 19.8 | 19.3 |
| **Inorganics** | | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U | 0.2 U |
| Antimony | mg/l | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U | 0.015 U |
| Arsenic | mg/l | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U |
| Barium | mg/l | 0.013 U | 0.013 U | 0.013 U | 0.0023 J | 0.013 U | 0.013 U | 0.0044 J | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U |
| Cadmium | mg/l | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U | 0.0025 U |
| Calcium | mg/l | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 0.15 J | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U |
| Chromium | mg/l | 0.005 U | 0.0014 J | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Cobalt | mg/l | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U | 0.013 U |
| Copper | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Iron | mg/l | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U | 0.08 U |
| Lead | mg/l | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U | 0.009 U |
| Magnesium | mg/l | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U |
| Manganese | mg/l | 0.0075 U | 0.0075 U | 0.0075 U | 0.0075 U | 0.0075 U | 0.0075 U | 0.0023 J | 0.0075 U | 0.0075 U | 0.0075 U | 0.0075 U | 0.0075 U | 0.0075 U |
| Mercury | mg/l | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 3.2E-05 J | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U | 0.0001 U |
| Nickel | mg/l | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U | 0.008 U |
| Potassium | mg/l | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 0.75 J | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U | 2.5 U |
| Selenium | mg/l | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U | 0.017 U |
| Silver | mg/l | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U | 0.005 U |
| Sodium | mg/l | 1 U | 1 U | 1 U | 1 U | 1 U | 1 U | 3.9 J | 1.1 J | 2 J | 1.1 J | 3.1 J | 1 U | 1.2 J |
| Thallium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Vanadium | mg/l | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U | 0.025 U |
| Zinc | mg/l | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.0047 J | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U | 0.01 U |

**Notes:**
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
RB = rinsate blank
TB = trip blank
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table C-6**
**Aqueous Quality Control Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Sample # | | CDL-TB1-03-050416 | CDL-TB1-03-081716 | CDL-TB1-03-082216 | CDL-TB1-03-111516 | CDL-TB2-03 | CDL-TB2-03-050616 | CDL-TB2-03-081916 | CDL-TB2-03-082416 | CDL-TB3-03 | CDL-TB3-03-051016 | CDL-TB3-03-082916 | CDL-TB4-03-051316 | CDL-TB4-03-083016 | CDL-TB5-03-083016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB |
| Analyte | Units | | | | | | | | | | | | | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,1-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dibromoethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloroethane | µg/l | 0.8 U | 2.9 | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.15 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,2-Dichloropropane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,3-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 1,4-Dichlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| 2-Butanone (MEK) | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 2-Hexanone | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Acetone | µg/l | 6 J | 4 U | 4 U | 4 U | 4 U | 4.8 J | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U | 4 U |
| Benzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromodichloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromoform | µg/l | 0.8 U | 0.61 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Bromomethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Disulfide | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Carbon Tetrachloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chlorobenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloroform | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Chloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| cis-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Cyclohexane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dibromochloromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Dichlorodifluoromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Ethylbenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Isopropylbenzene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Acetate | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methyl Tert-Butyl Ether | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylcylohexane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Methylene Chloride | µg/l | 0.5 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.51 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Styrene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Tetrachloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Toluene | µg/l | 0.27 J | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,2-Dichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| trans-1,3-Dichloropropene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichloroethene | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Trichlorofluoromethane | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Vinyl Chloride | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| Xylenes (Total) | µg/l | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U | 0.8 U |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4,5-Trichlorophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4,6-Trichlorophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dichlorophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dimethylphenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,4-Dinitrotoluene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,6-Dinitrotoluene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Chloronaphthalene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Chlorophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Methylnaphthalene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Methylphenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

**Table C-6**
**Aqueous Quality Control Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Sample # | | CDL-TB1-03-050416 | CDL-TB1-03-081716 | CDL-TB1-03-082216 | CDL-TB1-03-111516 | CDL-TB2-03 | CDL-TB2-03-050616 | CDL-TB2-03-081916 | CDL-TB2-03-082416 | CDL-TB3-03 | CDL-TB3-03-051016 | CDL-TB3-03-082916 | CDL-TB4-03-051316 | CDL-TB4-03-083016 | CDL-TB5-03-083016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB |
| Analyte | Units | | | | | | | | | | | | | | |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | |
| 2-Nitroaniline | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2-Nitrophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 3,3'-Dichlorobenzidine | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 3-Nitroaniline | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4,6-Dinitro-2-Methylphenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Bromophenyl Phenyl Ether | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Chloro-3-Methylphenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Chloroaniline | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Chlorophenyl Phenyl Ether | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Nitroaniline | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 4-Nitrophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Acenaphthene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Acenaphthylene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Acetophenone | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Anthracene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Atrazine | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzaldehyde | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(a)Anthracene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(a)Pyrene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(b)Fluoranthene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(g,h,i)Perylene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(k)Fluoranthene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzyl Butyl Phthalate | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Bis(2-Chloroethoxy)Methane | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Bis(2-Chloroethyl) Ether | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Bis(2-Ethylhexyl)Phthalate | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Caprolactam | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Carbazole | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chrysene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| m & p Cresol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Dibenzo(a,h)Anthracene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Dibenzofuran | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Diethyl Phthalate | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Dimethyl Phthalate | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Di-N-Butylphthalate | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Di-N-Octylphthalate | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fluoranthene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Fluorene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Hexachloro-1,3-Butadiene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Hexachlorobenzene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Hexachlorocyclopentadiene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Hexachloroethane | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Indeno(1,2,3-cd)Pyrene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Isophorone | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Naphthalene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nitrobenzene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| N-Nitroso-Di-N-Propylamine | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| N-Nitrosodiphenylamine | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total High Molecular Weight PAHs | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total Low Molecular Weight PAHs | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Pentachlorophenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Phenanthrene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Phenol | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Pyrene | µg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Dioxins/Furans** | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,6,7,8-HPCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8,9-HPCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,4,7,8-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

**Table C-6**
**Aqueous Quality Control Analytical Results**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Sample # | | CDL-TB1-03-050416 | CDL-TB1-03-081716 | CDL-TB1-03-082216 | CDL-TB1-03-111516 | CDL-TB2-03 | CDL-TB2-03-050616 | CDL-TB2-03-081916 | CDL-TB2-03-082416 | CDL-TB3-03 | CDL-TB3-03-051016 | CDL-TB3-03-082916 | CDL-TB4-03-051316 | CDL-TB4-03-083016 | CDL-TB5-03-083016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample Type | | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB | TB |
| Analyte | Units | | | | | | | | | | | | | | |
| **Dioxins/Furans Continued** | | | | | | | | | | | | | | | |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,6,7,8-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8,9-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,4,6,7,8-HXCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,4,7,8-PECDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,7,8-TCDD | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| OCDD | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| OCDF | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0 | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **Inorganics** | | | | | | | | | | | | | | | |
| Aluminum | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Antimony | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Arsenic | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Barium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cadmium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Calcium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chromium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Cobalt | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Copper | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Iron | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Lead | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Magnesium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Manganese | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Mercury | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Nickel | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Potassium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Selenium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Silver | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Sodium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Thallium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Vanadium | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | mg/l | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |

**Notes:**
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
RB = rinsate blank
TB = trip blank
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

# Appendix D

## Data Validation Reports

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q2 |
| SDG: | QF04017 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 09, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 | QF04017-001 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP13B-00-010 | QF04017-003 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP13C-00-006 | QF04017-002 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP22B-00-004 | QF04017-004 | Solid | Field Sample/N | X | X | X | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) QF04017. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 90 results (16.92%) out of the 532 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The laboratory noted that MS/MSD recoveries were outside control limits. |
| SW7471B | No additional comments; see Checklist for detail. |
| SW8260B | No additional comments; see Checklist for detail. |
| SW8270D | The laboratory noted that ICV/CCV recoveries were outside control limits |

November 08, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 09, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76828-001 (LB)/ QQ76828-001 | Aluminum | 18.00 | < 6.7 | < 50 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 (SD)/ QF04017-001MD | Zinc | -63.64 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (SD)/ QF04017-001MD | Potassium | 125.2 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP12C-00-009 (SD)/ QF04017-001MD | Iron | 209.1 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (SD)/ QF04017-001MD | Aluminum | 627.3 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (SD)/ QF04017-001MD | Antimony | 47.54 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP12C-00-009 (SD)/ QF04017-001MD | Lead | 67.86 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Calcium | 0.000 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Potassium | 138.3 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Iron | 300.0 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Zinc | 36.36 | 75 - 125 | 30 - 125 | percent | J/UJ | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Aluminum | 718.2 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Magnesium | 126.1 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Manganese | 127.3 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Antimony | 54.56 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP12C-00-009 (MS)/ QF04017-001MS | Lead | 67.86 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 | N | Antimony | 1.10 | 7.90 S | 7.90 J | - | mg/kg | M |
| CDL-TP12C-00-009 | N | Potassium | 270 | 620 S | 620 J | + | mg/kg | M |
| CDL-TP12C-00-009 | N | Lead | 0.540 | 170 S | 170 J | - | mg/kg | M |
| CDL-TP12C-00-009 | N | Magnesium | 270 | 1600 S | 1600 J | + | mg/kg | M |
| CDL-TP12C-00-009 | N | Manganese | 0.820 | 170 S | 170 J | + | mg/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Continuing Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| VSTD050EP (CV) | Chloromethane | 48.50 | 80 - 120 | 40 - 160 | % | J/UJ | V2 | |
| VSTD050EP (CV) | Dichlorodifluoromethane | 49.80 | 80 - 120 | 40 - 160 | % | J/UJ | V2 | |
| VSTD050EP (CV) | Vinyl chloride | 54.30 | 80 - 120 | 40 - 160 | % | J/UJ | V2 | |
| VSTD050EP (CV) | Bromomethane | 56.50 | 80 - 120 | 40 - 160 | % | J/UJ | V2 | |
| VSTD050EP (CV) | Chloroethane | 59.90 | 80 - 120 | 40 - 160 | % | J/UJ | V2 | |
| VSTD050EP (CV) | Trichlorofluoromethane | 68.30 | 80 - 120 | 40 - 160 | % | J/UJ | V2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Continuing Calibration Verification for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 | N | Bromomethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Chloroethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Chloromethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Dichlorodifluoromethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Trichlorofluoromethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Vinyl chloride | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Bromomethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Chloroethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Chloromethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Dichlorodifluoromethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Trichlorofluoromethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Vinyl chloride | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76864-002 (BS)/ QQ76864-002 | Bromomethane | 26.80 | 30 - 160 | 30 - 160 | percent | J/UJ | C | |
| QQ76864-003 (BD)/ QQ76864-003 | Bromomethane | 26.40 | 30 - 160 | 30 - 160 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP13B-00-010 | N | Bromomethane | 2600 | 2100 QL U | 2100 UJ | - | ug/kg | C/I |
| CDL-TP13C-00-006 | N | Bromomethane | 4400 | 3500 L U | 3500 UJ | - | ug/kg | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP13B-00-010 (N)/ QF04017-003 | Dibromofluoromethane | 76.09 | 78 - 119 | 10 - 119 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP13B-00-010 | N | 1,1,1-Trichloroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1,2,2-Tetrachloroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1,2-Trichloroethane | 2600 | 25000 Q | 25000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1-Dichloroethene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2,4-Trichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dibromo-3-chloropropane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dibromoethane (EDB) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dichloroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dichloropropane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,3-Dichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,4-Dichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 2-Butanone (MEK) | 5100 | 4100 Q U | 4100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 2-Hexanone | 5100 | 86000 Q | 86000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 4-Methyl-2-pentanone (MIBK) | 5100 | 74000 Q | 74000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Acetone | 10000 | 4000 Q U | 4000 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Benzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Bromodichloromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Bromoform | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Bromomethane | 2600 | 2100 QL U | 2100 UJ | - | ug/kg | C/I |
| CDL-TP13B-00-010 | N | Carbon disulfide | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Carbon tetrachloride | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chloroethane | 2600 | 2100 QL U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chloroform | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chloromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | cis-1,2-Dichloroethene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | cis-1,3-Dichloropropene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP13B-00-010 | N | Cyclohexane | 2600 | 14000 Q | 14000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Dibromochloromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Dichlorodifluoromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Ethylbenzene | 2600 | 9100 Q | 9100 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Isopropylbenzene (Cumene) | 2600 | 2500 JQ | 2500 J | - | ug/kg | I/TR |
| CDL-TP13B-00-010 | N | Methyl acetate | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Methyl tert-butyl ether (MTBE) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Methylcyclohexane | 2600 | 12000 Q | 12000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Methylene chloride | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Styrene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Tetrachloroethene (PCE) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Toluene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | trans-1,2-Dichloroethene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | trans-1,3-Dichloropropene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Trichloroethene (TCE) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Trichlorofluoromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Vinyl chloride | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Xylenes, Total | 2600 | 16000 Q | 16000 J | - | ug/kg | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Initial Calibration RSD/r^2/r**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| msd10 6/10/15 | Acenaphthene | 15.60 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd10 6/10/15 | Benzyl butyl phthalate | 17.70 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd10 6/10/15 | bis(2-Ethylhexyl) phthalate | 18.70 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd10 6/10/15 | Benzo(a)pyrene | 18.70 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | Dibenz (a,h)anthracene | 15.70 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | Benzyl butyl phthalate | 16.00 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | Benzo (b)fluoranthene | 16.80 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | bis(2-Ethylhexyl) phthalate | 19.50 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | Caprolactam | 20.00 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | 3,3'-Dichlorobenzidine | 20.00 | < 15 | < 15 | %rsd | J/UJ | G2 | |
| msd12 6/9/15 | 4,6-Dinitro-2-methylphenol | 20.10 | < 15 | < 15 | %rsd | J/UJ | G2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration RSD/r^2/r for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 | N | 3,3'-Dichlorobenzidine | 980 | 200 U | 200 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | 4,6-Dinitro-2-methylphenol | 980 | 800 U | 800 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Benzo(b)fluoranthene | 390 | 2100 | 2100 J | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Benzyl butyl phthalate | 390 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | bis(2-Ethylhexyl) phthalate | 390 | 4600 | 4600 J | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Caprolactam | 980 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Dibenz(a,h)anthracene | 390 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | 3,3'-Dichlorobenzidine | 4800 | 960 U | 960 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | 4,6-Dinitro-2-methylphenol | 4800 | 3900 U | 3900 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Benzo(b)fluoranthene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Benzyl butyl phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | bis(2-Ethylhexyl) phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Caprolactam | 4800 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Dibenz(a,h)anthracene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | 3,3'-Dichlorobenzidine | 4700 | 940 U | 940 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | 4,6-Dinitro-2-methylphenol | 4700 | 3800 U | 3800 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Benzo(b)fluoranthene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Benzyl butyl phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | bis(2-Ethylhexyl) phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Caprolactam | 4700 | 760 U | 760 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Dibenz(a,h)anthracene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | Acenaphthene | 400 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | Benzo(a)pyrene | 400 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | Benzyl butyl phthalate | 400 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | bis(2-Ethylhexyl) phthalate | 400 | 160 U | 160 UJ | | ug/kg | G2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76666-002 (BS)/ QQ76666-002 | 2,4-Dimethylphenol | 108.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ77004-002 (BS)/ QQ77004-002 | Acenaphthylene | 108.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ77004-002 (BS)/ QQ77004-002 | 2,4-Dimethylphenol | 114.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ77004-002 (BS)/ QQ77004-002 | 4-Chloroaniline | 96.01 | 10 - 95 | 10 - 95 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP12C-00-009 | N | Antimony | 1.10 | 7.90 S | 7.90 J | - | mg/kg | M |
| CDL-TP12C-00-009 | N | Potassium | 270 | 620 S | 620 J | + | mg/kg | M |
| CDL-TP12C-00-009 | N | Lead | 0.540 | 170 S | 170 J | - | mg/kg | M |
| CDL-TP12C-00-009 | N | Magnesium | 270 | 1600 S | 1600 J | + | mg/kg | M |
| CDL-TP12C-00-009 | N | Manganese | 0.820 | 170 S | 170 J | + | mg/kg | M |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP12C-00-009 | N | Bromomethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Chloroethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Chloromethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Dichlorodifluoromethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Trichlorofluoromethane | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP12C-00-009 | N | Vinyl chloride | 6.40 | 5.10 U | 5.10 UJ | - | ug/kg | V2 |
| CDL-TP13B-00-010 | N | 1,1,1-Trichloroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1,2,2-Tetrachloroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1,2-Trichloroethane | 2600 | 25000 Q | 25000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,1-Dichloroethene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2,4-Trichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dibromo-3-chloropropane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dibromoethane (EDB) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dichloroethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,2-Dichloropropane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,3-Dichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 1,4-Dichlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 2-Butanone (MEK) | 5100 | 4100 Q U | 4100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 2-Hexanone | 5100 | 86000 Q | 86000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | 4-Methyl-2-pentanone (MIBK) | 5100 | 74000 Q | 74000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Acetone | 10000 | 4000 Q U | 4000 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Benzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Bromodichloromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Bromoform | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Carbon disulfide | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Carbon tetrachloride | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chlorobenzene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chloroethane | 2600 | 2100 QL U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chloroform | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Chloromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | cis-1,2-Dichloroethene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP13B-00-010 | N | cis-1,3-Dichloropropene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Cyclohexane | 2600 | 14000 Q | 14000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Dibromochloromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Dichlorodifluoromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Ethylbenzene | 2600 | 9100 Q | 9100 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Isopropylbenzene (Cumene) | 2600 | 2500 JQ | 2500 J | - | ug/kg | I/TR |
| CDL-TP13B-00-010 | N | Methyl acetate | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Methyl tert-butyl ether (MTBE) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Methylcyclohexane | 2600 | 12000 Q | 12000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Methylene chloride | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Styrene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Tetrachloroethene (PCE) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Toluene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | trans-1,2-Dichloroethene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | trans-1,3-Dichloropropene | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Trichloroethene (TCE) | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Trichlorofluoromethane | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Vinyl chloride | 2600 | 2100 Q U | 2100 UJ | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Xylenes, Total | 2600 | 16000 Q | 16000 J | - | ug/kg | I |
| CDL-TP13B-00-010 | N | Bromomethane | 2600 | 2100 QL U | 2100 UJ | - | ug/kg | C/I |
| CDL-TP13C-00-006 | N | Bromomethane | 4400 | 3500 L U | 3500 UJ | - | ug/kg | C |
| CDL-TP22B-00-004 | N | Bromomethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Chloroethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Chloromethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Dichlorodifluoromethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Trichlorofluoromethane | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |
| CDL-TP22B-00-004 | N | Vinyl chloride | 5.30 | 4.20 U | 4.20 UJ | - | ug/kg | V2 |

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP12C-00-009 | N | 3,3'-Dichlorobenzidine | 980 | 200 U | 200 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | 4,6-Dinitro-2-methylphenol | 980 | 800 U | 800 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Benzo(b)fluoranthene | 390 | 2100 | 2100 J | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Benzyl butyl phthalate | 390 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | bis(2-Ethylhexyl) phthalate | 390 | 4600 | 4600 J | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Caprolactam | 980 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP12C-00-009 | N | Dibenz(a,h)anthracene | 390 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | 3,3'-Dichlorobenzidine | 4800 | 960 U | 960 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | 4,6-Dinitro-2-methylphenol | 4800 | 3900 U | 3900 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Benzo(b)fluoranthene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Benzyl butyl phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | bis(2-Ethylhexyl) phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP13B-00-010 | N | Caprolactam | 4800 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13B-00-010 | N | Dibenz(a,h)anthracene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | 3,3'-Dichlorobenzidine | 4700 | 940 U | 940 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | 4,6-Dinitro-2-methylphenol | 4700 | 3800 U | 3800 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Benzo(b)fluoranthene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Benzyl butyl phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | bis(2-Ethylhexyl) phthalate | 1900 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Caprolactam | 4700 | 760 U | 760 UJ | | ug/kg | G2 |
| CDL-TP13C-00-006 | N | Dibenz(a,h)anthracene | 1900 | 95.0 U | 95.0 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | Acenaphthene | 400 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | Benzo(a)pyrene | 400 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | Benzyl butyl phthalate | 400 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP22B-00-004 | N | bis(2-Ethylhexyl) phthalate | 400 | 160 U | 160 UJ | | ug/kg | G2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 | N | Bromomethane | 6.40 | 5.10 U | 5.10 U | 5.10 UJ | V2 |
| CDL-TP12C-00-009 | N | Chloroethane | 6.40 | 5.10 U | 5.10 U | 5.10 UJ | V2 |
| CDL-TP12C-00-009 | N | Chloromethane | 6.40 | 5.10 U | 5.10 U | 5.10 UJ | V2 |
| CDL-TP12C-00-009 | N | Dichlorodifluoromethane | 6.40 | 5.10 U | 5.10 U | 5.10 UJ | V2 |
| CDL-TP12C-00-009 | N | Trichlorofluoromethane | 6.40 | 5.10 U | 5.10 U | 5.10 UJ | V2 |
| CDL-TP12C-00-009 | N | Vinyl chloride | 6.40 | 5.10 U | 5.10 U | 5.10 UJ | V2 |
| CDL-TP22B-00-004 | N | Bromomethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | V2 |
| CDL-TP22B-00-004 | N | Chloroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | V2 |
| CDL-TP22B-00-004 | N | Chloromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | V2 |
| CDL-TP22B-00-004 | N | Dichlorodifluoromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | V2 |
| CDL-TP22B-00-004 | N | Trichlorofluoromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | V2 |
| CDL-TP22B-00-004 | N | Vinyl chloride | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | V2 |

**Modified Qualifiers for test method SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-TP12C-00-009 | N | 3,3'-Dichlorobenzidine | 980 | 200 U | 200 U | 200 UJ | G2 |
| CDL-TP12C-00-009 | N | 4,6-Dinitro-2-methylphenol | 980 | 800 U | 800 U | 800 UJ | G2 |
| CDL-TP12C-00-009 | N | Benzo(b)fluoranthene | 390 | 2100 | 2100 | 2100 J | G2 |
| CDL-TP12C-00-009 | N | Benzyl butyl phthalate | 390 | 160 U | 160 U | 160 UJ | G2 |
| CDL-TP12C-00-009 | N | bis(2-Ethylhexyl) phthalate | 390 | 4600 | 4600 | 4600 J | G2 |
| CDL-TP12C-00-009 | N | Caprolactam | 980 | 160 U | 160 U | 160 UJ | G2 |
| CDL-TP12C-00-009 | N | Dibenz(a,h)anthracene | 390 | 20.0 U | 20.0 U | 20.0 UJ | G2 |
| CDL-TP13B-00-010 | N | 3,3'-Dichlorobenzidine | 4800 | 960 U | 960 U | 960 UJ | G2 |
| CDL-TP13B-00-010 | N | 4,6-Dinitro-2-methylphenol | 4800 | 3900 U | 3900 U | 3900 UJ | G2 |
| CDL-TP13B-00-010 | N | Benzo(b)fluoranthene | 1900 | 95.0 U | 95.0 U | 95.0 UJ | G2 |
| CDL-TP13B-00-010 | N | Benzyl butyl phthalate | 1900 | 780 U | 780 U | 780 UJ | G2 |
| CDL-TP13B-00-010 | N | bis(2-Ethylhexyl) phthalate | 1900 | 780 U | 780 U | 780 UJ | G2 |
| CDL-TP13B-00-010 | N | Caprolactam | 4800 | 780 U | 780 U | 780 UJ | G2 |
| CDL-TP13B-00-010 | N | Dibenz(a,h)anthracene | 1900 | 95.0 U | 95.0 U | 95.0 UJ | G2 |
| CDL-TP13C-00-006 | N | 3,3'-Dichlorobenzidine | 4700 | 940 U | 940 U | 940 UJ | G2 |
| CDL-TP13C-00-006 | N | 4,6-Dinitro-2-methylphenol | 4700 | 3800 U | 3800 U | 3800 UJ | G2 |
| CDL-TP13C-00-006 | N | Benzo(b)fluoranthene | 1900 | 95.0 U | 95.0 U | 95.0 UJ | G2 |
| CDL-TP13C-00-006 | N | Benzyl butyl phthalate | 1900 | 780 U | 780 U | 780 UJ | G2 |
| CDL-TP13C-00-006 | N | bis(2-Ethylhexyl) phthalate | 1900 | 780 U | 780 U | 780 UJ | G2 |
| CDL-TP13C-00-006 | N | Caprolactam | 4700 | 760 U | 760 U | 760 UJ | G2 |
| CDL-TP13C-00-006 | N | Dibenz(a,h)anthracene | 1900 | 95.0 U | 95.0 U | 95.0 UJ | G2 |
| CDL-TP22B-00-004 | N | 3-Nitroaniline | 400 | 160 U | 160 U | 160 | |
| CDL-TP22B-00-004 | N | Acenaphthene | 400 | 20.0 U | 20.0 U | 20.0 UJ | G2 |
| CDL-TP22B-00-004 | N | Acenaphthylene | 400 | 20.0 U | 20.0 U | 20.0 | |
| CDL-TP22B-00-004 | N | Benzo(a)pyrene | 400 | 20.0 U | 20.0 U | 20.0 UJ | G2 |
| CDL-TP22B-00-004 | N | Benzyl butyl phthalate | 400 | 160 U | 160 U | 160 UJ | G2 |
| CDL-TP22B-00-004 | N | bis(2-Ethylhexyl) phthalate | 400 | 160 U | 160 U | 160 UJ | G2 |

**Table of Results with Modified Qualifiers**

| Modified Qualifiers for test method SW8270D | | | | | | | |
|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
| CDL-TP22B-00-004 | N | n-Nitrosodiphenylamine | 400 | 160 U | 160 U | 160 | |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| G2 | Initial Calibration RSD/r^2/r |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |
| V2 | CCV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | | | • | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. Some ICV recoveries were out of limits; however all had a high bias and associated samples were non-detect for the targets therefore no qualification is required. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |

**Level 4**
**Initial Calibration**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Standard ID:
Analyte:

Reported Y-Intercept:
Reported Slope: 0
Reported Correlation Coefficient (r):

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | | 0 |
| Level 2 = | | 15 |
| Level 3 = | | 1000 |
| Level 4 = | | 10000 |
| Level 5 = | | |
| Level 6 = | | |
| Level 7 = | | |

Y-Intercept = #DIV/0!
Slope = #DIV/0!
r2 = #DIV/0!
r = #DIV/0!

Comments: Single point calibration.

**Level 4**
**Continuing Calibration**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

CCV Standard ID: CCV2 6/9/2015 19:23
Analyte ID: Manganese
CCV % Rec.: 98

True CCV Conc. = 2.5
Found CCV Conc. = 2.4547

Calculated % Recovery = 98.2 Match

ICV Standard ID: ICV1 6/9/2015 17:27
Analyte ID: Manganese
ICV % Rec.: 102

True CCV Conc. = 1.25
Found CCV Conc. = 1.2759

Calculate( 102.1 Match

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| LCS ID: | QQ76828-002 | LCS/LCSD ID: | |
| Analyte ID: | Manganese | Analyte ID: | |
| Recovery: | 94 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

| | | | |
|---|---|---|---|
| Conc. LCS = | 94 | LCS Conc. = | |
| LCS Spike Conc. = | 100 | LCSD Conc. = | |
| % Recovery = | 94.0 | Match | RPD = #DIV/0! |

Comment: LCS only.

**Level 4**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

ICSAB Standard ID: ICSAB MW-6101 6/19/2015 12:41
Analyte ID: Manganese
ICSAB % Rec.: 104

True ICSAB Conc. = 0.5
ICSAB Conc. = 0.52

Calculated % Recovery = 104.0 Match

Comments:

**Level 4**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| Sample ID: | QF04017-001MS | Sample ID: | QF04017-001MS/QF04017-001MD |
| Analyte ID: | Manganese | Analyte ID: | Manganese |
| Recovery: | 126 | RPD: | 12 |

% Recovery = $\frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}}$ X 100

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2}$ X 100

| | |
|---|---|
| Conc. MS Sample = | 310.00 |
| Unspiked Samp. = | 170.00 |
| MS Spike Conc. = | 110.00 |

% Recovery = 127.3 Match

MS Conc. = 310
MSD Conc. = 270

RPD = 13.8% Match

**Level 4**
**Sample Result Verification**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

ug/L = $\frac{\text{Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor}}{\text{Initial Sample Amount (g or mL)}}$

Sample ID: **QF04017-001**

| Analyte | IDL (ug/L) | Corrected IDL (mg/kg) | Labortory Reported (mg/kg) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Amt. (g*) | % Moisture | Final Samp. Vol (mL) |
|---|---|---|---|---|---|---|---|---|---|
| Al | | 0 | **9100** | **9128** | 167.64 | 1 | 1.088 | 15.6 | 50 |
| Ba | | 0 | **95** | **95** | 1.7373 | 1 | 1.088 | 15.6 | 50 |
| Ca | | 0 | **11000** | **11444** | 210.17 | 1 | 1.088 | 15.6 | 50 |
| Co | | 0 | **2.9** | **2.9** | 0.05363 | 1 | 1.088 | 15.6 | 50 |
| Cr | | 0 | **13** | **13** | 0.23943 | 1 | 1.088 | 15.6 | 50 |
| Fe | | 0 | **9700** | **9738** | 178.84 | 1 | 1.088 | 15.6 | 50 |
| K | | 0 | **620** | **619** | 11.363 | 1 | 1.088 | 15.6 | 50 |
| Mg | | 0 | **1600** | **1557** | 28.59 | 1 | 1.088 | 15.6 | 50 |
| Mn | | 0 | **170** | **166** | 3.0548 | 1 | 1.088 | 15.6 | 50 |
| Na | | 0 | **110** | **112** | 2.0551 | 1 | 1.088 | 15.6 | 50 |
| Ni | | 0 | **11** | **11** | 0.20171 | 1 | 1.088 | 15.6 | 50 |
| V | | 0 | **15** | **15** | 0.275 | 1 | 1.088 | 15.6 | 50 |
| Hg | | 0 | | **0** | | 1 | 1.088 | 15.6 | 20 |
| Ag | | 0 | **0.12** | **0.12** | 0.00219 | 1 | 1.088 | 15.6 | 50 |
| As | | 0 | **6** | **6** | 0.11072 | 1 | 1.088 | 15.6 | 50 |
| Be | | 0 | **0.1** | **0.10** | 0.0019 | 1 | 1.088 | 15.6 | 50 |
| Cd | | 0 | **0.53** | **0.53** | 0.0097 | 1 | 1.088 | 15.6 | 50 |
| Cu | | 0 | **20** | **20** | 0.36455 | 1 | 1.088 | 15.6 | 50 |
| Pb | | 0 | **170** | **168** | 3.0921 | 1 | 1.088 | 15.6 | 50 |
| Sb | | 0 | **7.9** | **7.85** | 0.1442 | 1 | 1.088 | 15.6 | 50 |
| Mn | | 0 | | **0** | | 1 | 1.088 | 15.6 | 50 |
| | | | | **0** | | 1 | 1.088 | 15.6 | 50 |
| | | | | **0** | | 1 | 1.088 | 15.6 | 50 |

Comments: Match

**Level 4**
**Initial Calibration**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

**Method:** SW7470A

Cal ID: 15HG0718(6/16/15)
Analyte: Mercury

Correlation Coeff 0.998526
Slope: 8.5062E-05
Intercept: -2.3960E-01

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 0 | -102 |
| Level 2 = | 1 | 11976 |
| Level 3 = | 5 | 63431 |
| Level 4 = | 10 | 128936 |
| Level 5 = | 15 | 180300 |
| Level 6 = | 20 | 231930 |
| Level 7 = | | |
| Level 8 = | | |
| Level 9 = | | |

| | | |
|---|---|---|
| Corr Coef = | 0.998526 | Matches |
| Slope = | 8.5062E-05 | Matches |
| Y-Int= | -2.3968E-01 | Matches |

Comments: Slope and Intercept not located in Lab Report.

**Level 4**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

ICV Standard ID: ICV 15HG0720(6/16/15) - 1
Analyte ID: Hg
ICV % Rec.: 102.1

True ICV Conc. = 10.0
Found ICV Conc. = 10.2115

Calculated % D = 102.1 Matches

Comment:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

CCV Standard ID: CCV 15HG0716(6/16/15) - 1
Analyte ID: Hg
%D: 104.1

True CCV Conc. = 10.0
Found CCV Conc. = 10.4065

Calculated % D = 104.1 Match

Comment:

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A
**Matrix:** Water

---

| | | | |
|---|---|---|---|
| LCS ID: | QQ77263-002 | LCS/LCSD ID: | |
| Analyte ID: | Hg | Analyte ID: | Hg |
| Recovery: | 96 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD= $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

Conc. LCS = 0.80
LCS Spike Conc. = 0.83

LCS Conc. =
LCSD Conc. =

% Recovery = 96.4 Matches

RPD = #DIV/0! Match

Comments: LCS only.

**Level 4**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

Sample ID: QF04017-001
Compound ID: Hg
Reported Result: 0.0760 J mg/kg

Conc. In Sample = $\frac{\text{(Inst Response*Slope+Y-int)*(Dilution Factor)*(Final Vol.)}}{\text{(Initial Amount)*(\% Solids*0.01)}}$

| | | Units | |
|---|---|---|---|
| Inst. Resp. = | 12370.0000 | | |
| Slope = | 0.000085 | | |
| Y-Int = | -0.239680 | | |
| Initial Amount = | 0.633 | g | |
| Dilution Factor = | 1.0 | | |
| Final Amount = | 50 | mL | |
| % Solids = | 84.3667 | % | |
| Conc. In Sample = | 76.0744 | ug/kg | Match |

Comments:

Comments -

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 6/9/2015 8:26 |
| Recalculated Ion Ratio: | 174:95 |
| Reported Ratio: | 90.40% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 164416
Reference Mass Response = 181824

Relative Abundance = 90.43% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: VSTD050DG
Compound ID: Methylcyclohexane
Reported Result: 0.6192

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

Compound Area = 275965
I.S. Area = 445672
Compound Conc. = 50.0
I.S. Conc. = 50

RRF = 0.6192
Matches

Calibration ID: 6/3/2015 18:08
Compound ID: Methylcyclohexane
%RSD: 4.7%
Average RRF = 0.58521

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} X\ 100$$

RF Level 1 = 0.5394
RF Level 2 = 0.6032
RF Level 3 = 0.5904
RF Level 4 = 0.6192
RF Level 5 = 0.5723
RF Level 6 = 0.5867
RF Level 7 =
RF Level 8 =
RF Level 9 =
RF Level 10 =

Standard Deviation = 0.027
Average RRF = 0.5852 Matches
%RSD = 4.695 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| RRF Standard ID: | VSTD050FB | %D Standard ID: | VSTD050FB 09-Jun-2015 09:31:30 |
| Compound ID: | Methylcyclohexane | Compound ID: | Methylcyclohexane |
| Reported Result: | 0.620 | Reported %D: | 5.9% |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}} \qquad \%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} X\ 100$$

| | | | |
|---|---|---|---|
| Compound Area = | 345651 | Average RRF = | 0.5852 |
| I.S. Area = | 557496 | CCV RRF = | 0.620 |
| Compound Conc. = | 50 | | |
| I.S. Conc. = | 50 | %D = | 5.9 Matches |

CCV RRF = 0.620 Matches %D Indicating Bias = -5.9

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Lab ID : CDL-TP12C-00
Compound ID: Toluene-d8
Reported Result: 96.0

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 52.01
Surr. Spike Conc. =

% Recovery = #DIV/0!

Comments: Concentrations of surrogate were not provided

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: QQ76864-002
Compound ID: Methylcyclohexane
Recovery: 91

Sample ID: QQ76864-002/QQ76864-003
Compound ID: Methylcyclohexane
RPD: 1%

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 2300
LCS Spike Conc. = 2500

LCS Conc. = 2300.00
LCSD Conc. = 2300.00

% Recovery = 92 Matches

RPD = 0.0 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Sample ID: | QF04017-002 |
| Compound ID: | Methylcyclohexane |
| Reported Result: | 66000.00 |

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount} \times (\%\ \text{Solids} * .01)} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 452217 | Area |
| Area I.S. = | 518580 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.58521 | NA |
| Final Volume = | 5.00 | mL |
| Initial Amount = | 6.36 | g |
| Dilution Factor = | 1000.0 | NA |
| % Solids = | 88.9 | % |
| Conc. In Sample = | 65887.12 | |
| | Matches | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 6/10/2015 16:19 |
| Recalculated Ion Ratio: | 198:51 |
| Reported Ratio: | 41.1% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 39360
Reference Mass Response = 96088

Relative Abundance = 41.0% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: Ical, Level: 7
Compound ID: Naphthalene
Reported Result: 1.018571

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 3039528
I.S. Area = 4774577
Compound Conc. = 25.0
I.S. Conc. = 40

RRF = 1.018571
Matches

Calibration ID: msd12 09-Jun-2015 12:30:30
Compound ID: Naphthalene
%RSD: 3.50%
Average RRF = 0.979732

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 0.922
RF Level 2 = 0.952
RF Level 3 = 0.955
RF Level 4 = 0.970
RF Level 5 = 0.977
RF Level 6 = 1.019128
RF Level 7 = 1.018571
RF Level 8 = 1.016771
RF Level 9 = 0.987235

Standard Deviation = 0.034
Average RRF = 0.9797322 Matches
%RSD = 3.48 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: SVMS 1139
Compound ID: Naphthalene
Reported Result: 1.022

%D Standard ID: SVMS 1139
Compound ID: Naphthalene
Reported %D: 4.3%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 2138524
I.S. Area = 4185582
Compound Conc. = 20
I.S. Conc. = 40

Average RRF = 0.980
CCV RRF = 1.022
%D = 4.3 Matches

CCV RRF = 1.022 Matches

%D Indicating Bias = -4.3

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID:
Compound ID: Phenol-d5
Reported Result:

% Recovery = Conc. Surr. In Sample X 100
Conc. Surr. Spiked

Conc. In Sample = 14.94
Surr. Spike Conc. =

% Recovery = #DIV/0!

Comments: spke concentrations were not provided

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QF04017
Lab: Shealy
Client: CDM Smith

Date: 11/4/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ76666-002 | Sample ID: | |
| Compound ID: | Naphthalene | Compound ID: | |
| Recovery: | 73% | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}}$ X 100

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2}$ X 100

Conc. LCS = 2444.16
LCS Spike Conc. = 3333.33

LCS Conc. =
LCSD Conc. =

% Recovery = 73 Matches

RPD = #DIV/0! Matches

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QF04017 | Date: | 11/4/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: QF04017-002
Compound ID: Naphthalene
Reported Result: 3500 ug/kg

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor
TFA-MW291

| | | Units |
|---|---|---|
| Area Sample = | 362895 | Area |
| Area I.S. = | 3930989 | Area |
| Conc. I.S. = | 40 | |
| Average RRF = | 0.980 | NA |
| Final Volume = | 5000.0 | uL |
| Initial Amount = | 30.0000 | g |
| Dilution Factor = | 5.0 | NA |
| % Solids = | 88.9 | |
| Conc. In Sample = | 3533 | Matches |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q2 |
| SDG: | QE29016 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 09, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7470A | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02 | QE29016-004 | Water | Equipment Blank/EB | X | X | | | |
| CDL-TP11B-00-12 | QE29016-001 | Solid | Field Sample/N | X | | X | X | X |
| CDL-TP11C-00-12 | QE29016-002 | Solid | Field Sample/N | X | | X | X | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) QE29016. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

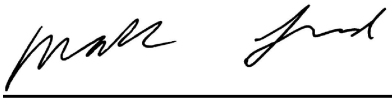
- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 128 results (44.44%) out of the 288 results (sample and field QC samples) reported are qualified based on review and 92 results (31.94%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | No additional comments; see Checklist for detail. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW7471B | No additional comments; see Checklist for detail. |
| SW8260B | The laboratory noted that CCV/LCS/Surrogate recoveries and Hold Times were outside control limits. |
| SW8270D | The laboratory noted that ICV/MS/MSD recoveries and Hold Times were outside control limits. |



October 30, 2017

Reviewed by Mark Lund, Project Scientist, Synectics,
Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 17, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics,
Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76828-001 (LB)/ QQ76828-001 | Aluminum | 18.00 | < 6.7 | < 50 | mg/kg | U/None | L | |
| QQ77434-001 (LB)/ QQ77434-001 | Copper | 0.2400 | < 0.19 | < 0.5 | mg/kg | U/None | L | |
| QQ77434-001 (LB)/ QQ77434-001 | Aluminum | 20.00 | < 6.7 | < 50 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW6010C, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76825-001 (LB)/ QQ76825-001 | Arsenic | 0.006100 | < 0.0022 | < 0.015 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW6010C, Total**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02 | EB | Arsenic | 0.0150 | 0.00240 BJ | 0.0150 U | + | mg/l | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02 (EB)/ QE29016-004 | Arsenic | 0.002400 | < 0.0022 | < 0.015 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76864-002 (BS)/ QQ76864-002 | Bromomethane | 26.80 | 30 - 160 | 30 - 160 | percent | J/UJ | C | |
| QQ76864-003 (BD)/ QQ76864-003 | Bromomethane | 26.40 | 30 - 160 | 30 - 160 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-00-12 | N | Bromomethane | 27000 | 22000 QL U | 22000 UJ | | ug/kg | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-00-12 (N)/ QE29016-002 | Dibromofluoromethane | 126.4 | 78 - 119 | 10 - 119 | percent | J/None | I | |
| CDL-TP11C-00-12 (N)/ QE29016-002 | Toluene-d8 | 157.4 | 85 - 116 | 10 - 116 | percent | J/None | I | |
| CDL-TP11C-00-12 (N)/ QE29016-002 | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 180.6 | 79 - 119 | 10 - 119 | percent | J/None | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-00-12 | N | Isopropylbenzene (Cumene) | 27000 | 11000 JQ | 11000 J | + | ug/kg | I/TR |
| CDL-TP11C-00-12 | N | Methylcyclohexane | 27000 | 170000 Q | 170000 J | + | ug/kg | I |
| CDL-TP11C-00-12 | N | Xylenes, Total | 27000 | 45000 Q | 45000 J | + | ug/kg | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Test Hold Time**

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 (N)/ QE29016-001 | | 15.26 | < 14 | | days | J/R | H1 | Test Exceeds UWL |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Test Hold Time for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | 1,1,1-Trichloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1,2,2-Tetrachloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1,2-Trichloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1-Dichloroethene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2,4-Trichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dibromo-3-chloropropane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dibromoethane (EDB) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dichloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dichloropropane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,3-Dichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,4-Dichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 2-Butanone (MEK) | 1900 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 2-Hexanone | 1900 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 4-Methyl-2-pentanone (MIBK) | 1900 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Acetone | 3800 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Benzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Bromodichloromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Bromoform | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Bromomethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Carbon disulfide | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Carbon tetrachloride | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chloroform | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chloromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | cis-1,2-Dichloroethene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | cis-1,3-Dichloropropene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Cyclohexane | 950 | 760 H U | 760 R | - | ug/kg | H1 |

**Qualified Results associated with the Test Hold Time for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | Dibromochloromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Dichlorodifluoromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Ethylbenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Isopropylbenzene (Cumene) | 950 | 520 HJ | 520 J | - | ug/kg | H1/TR |
| CDL-TP11B-00-12 | N | Methyl acetate | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Methyl tert-butyl ether (MTBE) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Methylcyclohexane | 950 | 3500 H | 3500 J | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Methylene chloride | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Styrene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Tetrachloroethene (PCE) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Toluene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | trans-1,2-Dichloroethene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | trans-1,3-Dichloropropene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Trichloroethene (TCE) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Trichlorofluoromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Vinyl chloride | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Xylenes, Total | 950 | 2000 H | 2000 J | - | ug/kg | H1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Initial Calibration RSD/r^2/r**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 6-9-2015 | Dibenz (a,h)anthracene | 15.70 | < 15 | < 15 | % | J/UJ | G2 | |
| 6-9-2015 | Benzyl butyl phthalate | 16.00 | < 15 | < 15 | % | J/UJ | G2 | |
| 6-9-2015 | Benzo (b)fluoranthene | 16.80 | < 15 | < 15 | % | J/UJ | G2 | |
| 6-9-2015 | bis(2-Ethylhexyl) phthalate | 19.50 | < 15 | < 15 | % | J/UJ | G2 | |
| 6-9-2015 | 3,3'-Dichlorobenzidine | 20.00 | < 15 | < 15 | % | J/UJ | G2 | |
| 6-9-2015 | 4,6-Dinitro-2-methylphenol | 20.20 | < 15 | < 15 | % | J/UJ | G2 | |
| 6-9-2015 | Caprolactam | 20.00 | < 15 | < 15 | % | J/UJ | G2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration RSD/r^2/r for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | Caprolactam | 960 | 160 H U | 160 R | + | ug/kg | M/G2/H2 |
| CDL-TP11C-00-12 | N | 3,3'-Dichlorobenzidine | 980 | 200 U | 200 UJ | | ug/kg | G2 |

**Qualified Results associated with the Initial Calibration RSD/r^2/r for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-00-12 | N | 4,6-Dinitro-2-methylphenol | 980 | 800 U | 800 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | Benzo(b)fluoranthene | 390 | 120 J | 120 J | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | Benzyl butyl phthalate | 390 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | bis(2-Ethylhexyl) phthalate | 390 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | Caprolactam | 980 | 160 S U | 160 UJ | | ug/kg | M/G2 |
| CDL-TP11C-00-12 | N | Dibenz(a,h)anthracene | 390 | 20.0 U | 20.0 UJ | | ug/kg | G2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 6-16-2015 16:24 (IV) | Acenaphthylene | 122.0 | 80 - 120 | 80 - 120 | % | J/None | V1 | |
| TCLICVCC (IV) | Caprolactam | 0.000 | 80 - 120 | 80 - 120 | % | J/UJ | V1 | |
| TCLICVCC (IV) | Pentachlorophenol | 73.10 | 80 - 120 | 80 - 120 | % | J/UJ | V1 | |
| TCLICVCC (IV) | 4-Nitrophenol | 77.90 | 80 - 120 | 80 - 120 | % | J/UJ | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration Verification for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-00-12 | N | 4-Nitrophenol | 980 | 800 U | 800 UJ | - | ug/kg | V1 |
| CDL-TP11C-00-12 | N | Pentachlorophenol | 980 | 320 U | 320 UJ | - | ug/kg | V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76581-002 (BS)/ QQ76581-002 | Caprolactam | 115.0 | 20 - 100 | 20 - 100 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ76666-002 (BS)/ QQ76666-002 | 2,4-Dimethylphenol | 108.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ77192-002 (BS)/ QQ77192-002 | Acenaphthylene | 105.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ77192-002 (BS)/ QQ77192-002 | 2,4-Dimethylphenol | 120.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ77192-002 (BS)/ QQ77192-002 | 4-Chloroaniline | 96.01 | 10 - 95 | 10 - 95 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-0012 (SD)/ QE29016-002MD | 2-Methylnaphthalene | -14.29 | 45 - 105 | 10 - 105 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP11C-0012 (SD)/ QE29016-002MD | Naphthalene | 0.000 | 40 - 105 | 10 - 105 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP11C-0012 (SD)/ QE29016-002MD | 2,4-Dimethylphenol | 107.5 | 30 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP11C-0012 (SD)/ QE29016-002MD | n-Nitrosodiphenylamine | 132.5 | 50 - 115 | 10 - 115 | percent | J/None | M | |
| CDL-TP11C-0012 (SD)/ QE29016-002MD | Phenanthrene | 112.5 | 50 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-TP11C-0012 (SD)/ QE29016-002MD | Caprolactam | 24.25 | 45 - 122 | 10 - 122 | percent | J/UJ | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | 2-Methylnaphthalene | -42.86 | 45 - 105 | 10 - 105 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | Naphthalene | 0.000 | 40 - 105 | 10 - 105 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | Acenaphthylene | 112.5 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | Hexachloroethane | 117.5 | 35 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | 2,4-Dimethylphenol | 132.5 | 30 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | n-Nitrosodiphenylamine | 135.0 | 50 - 115 | 10 - 115 | percent | J/None | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | Anthracene | 105.3 | 55 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | Phenanthrene | 112.5 | 50 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-TP11C-00-12 (MS)/ QE29016-002MS | Caprolactam | 30.00 | 45 - 122 | 10 - 122 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | Caprolactam | 960 | 160 H U | 160 R | + | ug/kg | M/G2/H2 |
| CDL-TP11B-00-12 | N | Anthracene | 380 | 170 HJ | 170 J | + | ug/kg | M/H2 |
| CDL-TP11B-00-12 | N | Phenanthrene | 380 | 650 H | 650 J | + | ug/kg | M/H2 |
| CDL-TP11C-00-12 | N | Caprolactam | 980 | 160 S U | 160 UJ | | ug/kg | M/G2 |
| CDL-TP11C-00-12 | N | Anthracene | 390 | 210 J | 210 J | + | ug/kg | M |

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11C-00-12 | N | Phenanthrene | 390 | 790 | 790 J | + | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QE29016-002MD (SD)/ QE29016-002MD | n-Nitrosodi-n-propylamine | 30.30 | < 30 | < 30 | rpd | J/None | D | |
| QE29016-002MD (SD)/ QE29016-002MD | 2-Chlorophenol | 31.58 | < 30 | < 30 | rpd | J/None | D | |
| QE29016-002MD (SD)/ QE29016-002MD | Nitrobenzene | 33.33 | < 30 | < 30 | rpd | J/None | D | |
| QE29016-002MD (SD)/ QE29016-002MD | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 36.73 | < 30 | < 30 | rpd | J/None | D | |
| QE29016-002MD (SD)/ QE29016-002MD | Hexachlorocyclopentadiene | 40.99 | < 30 | < 30 | rpd | J/None | D | |
| QE29016-002MD (SD)/ QE29016-002MD | Benzaldehyde | 48.00 | < 30 | < 30 | rpd | J/None | D | |
| QE29016-002MD (SD)/ QE29016-002MD | Hexachloroethane | 50.67 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Prep Hold Time**

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of extraction found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 (N)/ QE29016-001 | | 15.24 | < 14 | < 14 | days | J/R | H2 | Prep Exceeds UCL |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Prep Hold Time for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | 2,4,5-Trichlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4,6-Trichlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dichlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dimethylphenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dinitrophenol | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dinitrotoluene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,6-Dinitrotoluene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Chloronaphthalene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Chlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Methylnaphthalene | 380 | 2400 H | 2400 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Methylphenol (o-Cresol) | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Nitroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Nitrophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 3,3'-Dichlorobenzidine | 960 | 190 H U | 190 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 3-Nitroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4,6-Dinitro-2-methylphenol | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Bromophenyl phenyl ether | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Chloro-3-methylphenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Chloroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Chlorophenyl phenyl ether | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Nitroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Nitrophenol | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Acenaphthene | 380 | 19.0 H U | 19.0 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Acenaphthylene | 380 | 19.0 H U | 19.0 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Acetophenone | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Anthracene | 380 | 170 HJ | 170 J | + | ug/kg | M/H2 |
| CDL-TP11B-00-12 | N | Atrazine | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzaldehyde | 960 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(a)anthracene | 380 | 130 HJ | 130 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(a)pyrene | 380 | 100 HJ | 100 J | | ug/kg | H2 |

**Qualified Results associated with the Prep Hold Time for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | Benzo(b)fluoranthene | 380 | 120 HJ | 120 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(g,h,i)perylene | 380 | 39.0 HJ | 39.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(k)fluoranthene | 380 | 47.0 HJ | 47.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzyl butyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Biphenyl (Diphenyl) | 380 | 300 HJ | 300 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | bis(2-Chloroethoxy) methane | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | bis(2-Ethylhexyl) phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Caprolactam | 960 | 160 H U | 160 R | + | ug/kg | M/G2/H2 |
| CDL-TP11B-00-12 | N | Carbazole | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Chrysene | 380 | 91.0 HJ | 91.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Dibenz(a,h)anthracene | 380 | 19.0 H U | 19.0 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Dibenzofuran | 380 | 220 HJ | 220 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Diethyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Dimethyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Di-n-butyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Di-n-octyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Fluoranthene | 380 | 380 H | 380 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Fluorene | 380 | 260 HJ | 260 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachlorobenzene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachlorobutadiene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachlorocyclopentadiene | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachloroethane | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Indeno(1,2,3-c,d)pyrene | 380 | 37.0 HJ | 37.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Isophorone | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | m,p-Cresol | 770 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Naphthalene | 380 | 590 H | 590 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Nitrobenzene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | n-Nitrosodi-n-propylamine | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | n-Nitrosodiphenylamine | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Pentachlorophenol | 960 | 310 H U | 310 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Phenanthrene | 380 | 650 H | 650 J | + | ug/kg | M/H2 |
| CDL-TP11B-00-12 | N | Phenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Pyrene | 380 | 250 HJ | 250 J | | ug/kg | H2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: Total | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-RB1-02 | EB | Arsenic | 0.0150 | 0.00240 BJ | 0.0150 U | + | mg/l | L |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP11B-00-12 | N | 1,1,1-Trichloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1,2,2-Tetrachloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1,2-Trichloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,1-Dichloroethene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2,4-Trichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dibromo-3-chloropropane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dibromoethane (EDB) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dichloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,2-Dichloropropane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,3-Dichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 1,4-Dichlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 2-Butanone (MEK) | 1900 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 2-Hexanone | 1900 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | 4-Methyl-2-pentanone (MIBK) | 1900 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Acetone | 3800 | 1500 H U | 1500 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Benzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Bromodichloromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Bromoform | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Bromomethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Carbon disulfide | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Carbon tetrachloride | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chlorobenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chloroethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chloroform | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Chloromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | cis-1,2-Dichloroethene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | cis-1,3-Dichloropropene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Cyclohexane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Dibromochloromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Dichlorodifluoromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Ethylbenzene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Isopropylbenzene (Cumene) | 950 | 520 HJ | 520 J | - | ug/kg | H1/TR |
| CDL-TP11B-00-12 | N | Methyl acetate | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Methyl tert-butyl ether (MTBE) | 950 | 760 H U | 760 R | - | ug/kg | H1 |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP11B-00-12 | N | Methylcyclohexane | 950 | 3500 H | 3500 J | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Methylene chloride | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Styrene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Tetrachloroethene (PCE) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Toluene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | trans-1,2-Dichloroethene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | trans-1,3-Dichloropropene | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Trichloroethene (TCE) | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Trichlorofluoromethane | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Vinyl chloride | 950 | 760 H U | 760 R | - | ug/kg | H1 |
| CDL-TP11B-00-12 | N | Xylenes, Total | 950 | 2000 H | 2000 J | - | ug/kg | H1 |
| CDL-TP11C-00-12 | N | Isopropylbenzene (Cumene) | 27000 | 11000 JQ | 11000 J | + | ug/kg | I/TR |
| CDL-TP11C-00-12 | N | Methylcyclohexane | 27000 | 170000 Q | 170000 J | + | ug/kg | I |
| CDL-TP11C-00-12 | N | Xylenes, Total | 27000 | 45000 Q | 45000 J | + | ug/kg | I |
| CDL-TP11C-00-12 | N | Bromomethane | 27000 | 22000 QL U | 22000 UJ | | ug/kg | C |

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP11B-00-12 | N | 2,4,5-Trichlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4,6-Trichlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dichlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dimethylphenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dinitrophenol | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,4-Dinitrotoluene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2,6-Dinitrotoluene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Chloronaphthalene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Chlorophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Methylnaphthalene | 380 | 2400 H | 2400 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Methylphenol (o-Cresol) | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Nitroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 2-Nitrophenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 3,3'-Dichlorobenzidine | 960 | 190 H U | 190 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 3-Nitroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4,6-Dinitro-2-methylphenol | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Bromophenyl phenyl ether | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Chloro-3-methylphenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Chloroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Chlorophenyl phenyl ether | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Nitroaniline | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | 4-Nitrophenol | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Acenaphthene | 380 | 19.0 H U | 19.0 R | | ug/kg | H2 |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP11B-00-12 | N | Acenaphthylene | 380 | 19.0 H U | 19.0 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Acetophenone | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Atrazine | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzaldehyde | 960 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(a)anthracene | 380 | 130 HJ | 130 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(a)pyrene | 380 | 100 HJ | 100 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(b)fluoranthene | 380 | 120 HJ | 120 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(g,h,i)perylene | 380 | 39.0 HJ | 39.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzo(k)fluoranthene | 380 | 47.0 HJ | 47.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Benzyl butyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Biphenyl (Diphenyl) | 380 | 300 HJ | 300 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | bis(2-Chloroethoxy) methane | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | bis(2-Ethylhexyl) phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Caprolactam | 960 | 160 H U | 160 R | + | ug/kg | M/G2/H2 |
| CDL-TP11B-00-12 | N | Carbazole | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Chrysene | 380 | 91.0 HJ | 91.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Dibenz(a,h)anthracene | 380 | 19.0 H U | 19.0 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Dibenzofuran | 380 | 220 HJ | 220 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Diethyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Dimethyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Di-n-butyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Di-n-octyl phthalate | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Fluoranthene | 380 | 380 H | 380 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Fluorene | 380 | 260 HJ | 260 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachlorobenzene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachlorobutadiene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachlorocyclopentadiene | 960 | 780 H U | 780 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Hexachloroethane | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Indeno(1,2,3-c,d)pyrene | 380 | 37.0 HJ | 37.0 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Isophorone | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | m,p-Cresol | 770 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Naphthalene | 380 | 590 H | 590 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Nitrobenzene | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | n-Nitrosodi-n-propylamine | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | n-Nitrosodiphenylamine | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Pentachlorophenol | 960 | 310 H U | 310 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Phenol | 380 | 160 H U | 160 R | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Pyrene | 380 | 250 HJ | 250 J | | ug/kg | H2 |
| CDL-TP11B-00-12 | N | Anthracene | 380 | 170 HJ | 170 J | + | ug/kg | M/H2 |
| CDL-TP11B-00-12 | N | Phenanthrene | 380 | 650 H | 650 J | + | ug/kg | M/H2 |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP11C-00-12 | N | 3,3'-Dichlorobenzidine | 980 | 200 U | 200 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | 4,6-Dinitro-2-methylphenol | 980 | 800 U | 800 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | 4-Nitrophenol | 980 | 800 U | 800 UJ | - | ug/kg | V1 |
| CDL-TP11C-00-12 | N | Benzo(b)fluoranthene | 390 | 120 J | 120 J | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | Benzyl butyl phthalate | 390 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | bis(2-Ethylhexyl) phthalate | 390 | 160 U | 160 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | Caprolactam | 980 | 160 S U | 160 UJ | | ug/kg | M/G2 |
| CDL-TP11C-00-12 | N | Dibenz(a,h)anthracene | 390 | 20.0 U | 20.0 UJ | | ug/kg | G2 |
| CDL-TP11C-00-12 | N | Pentachlorophenol | 980 | 320 U | 320 UJ | - | ug/kg | V1 |
| CDL-TP11C-00-12 | N | Anthracene | 390 | 210 J | 210 J | + | ug/kg | M |
| CDL-TP11C-00-12 | N | Phenanthrene | 390 | 790 | 790 J | + | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-TP11B-00-12 | N | 2-Methylnaphthalene | 380 | 2400 H | 2400 J | 2400 J | H2 |
| CDL-TP11B-00-12 | N | Anthracene | 380 | 170 HJ | 170 J | 170 J | M/H2 |
| CDL-TP11B-00-12 | N | Benzo(a)anthracene | 380 | 130 HJ | 130 J | 130 J | H2 |
| CDL-TP11B-00-12 | N | Benzo(a)pyrene | 380 | 100 HJ | 100 J | 100 J | H2 |
| CDL-TP11B-00-12 | N | Benzo(b)fluoranthene | 380 | 120 HJ | 120 J | 120 J | H2 |
| CDL-TP11B-00-12 | N | Benzo(g,h,i)perylene | 380 | 39.0 HJ | 39.0 J | 39.0 J | H2 |
| CDL-TP11B-00-12 | N | Benzo(k)fluoranthene | 380 | 47.0 HJ | 47.0 J | 47.0 J | H2 |
| CDL-TP11B-00-12 | N | Biphenyl (Diphenyl) | 380 | 300 HJ | 300 J | 300 J | H2 |
| CDL-TP11B-00-12 | N | Caprolactam | 960 | 160 H U | 160 R | 160 R | M/G2/H2 |
| CDL-TP11B-00-12 | N | Chrysene | 380 | 91.0 HJ | 91.0 J | 91.0 J | H2 |
| CDL-TP11B-00-12 | N | Dibenzofuran | 380 | 220 HJ | 220 J | 220 J | H2 |
| CDL-TP11B-00-12 | N | Fluoranthene | 380 | 380 H | 380 J | 380 J | H2 |
| CDL-TP11B-00-12 | N | Fluorene | 380 | 260 HJ | 260 J | 260 J | H2 |
| CDL-TP11B-00-12 | N | Indeno(1,2,3-c,d)pyrene | 380 | 37.0 HJ | 37.0 J | 37.0 J | H2 |
| CDL-TP11B-00-12 | N | Naphthalene | 380 | 590 H | 590 J | 590 J | H2 |
| CDL-TP11B-00-12 | N | Phenanthrene | 380 | 650 H | 650 J | 650 J | M/H2 |
| CDL-TP11B-00-12 | N | Pyrene | 380 | 250 HJ | 250 J | 250 J | H2 |
| CDL-TP11C-00-12 | N | 3,3'-Dichlorobenzidine | 980 | 200 U | 200 U | 200 UJ | G2 |
| CDL-TP11C-00-12 | N | 4,6-Dinitro-2-methylphenol | 980 | 800 U | 800 U | 800 UJ | G2 |
| CDL-TP11C-00-12 | N | 4-Nitrophenol | 980 | 800 U | 800 U | 800 UJ | V1 |
| CDL-TP11C-00-12 | N | Acenaphthene | 390 | 550 | 550 J | 550 J | M |
| CDL-TP11C-00-12 | N | Anthracene | 390 | 210 J | 210 J | 210 J | M |
| CDL-TP11C-00-12 | N | Benzo(a)anthracene | 390 | 130 J | 130 J | 130 | |
| CDL-TP11C-00-12 | N | Benzo(a)pyrene | 390 | 85.0 J | 85.0 J | 85.0 | |
| CDL-TP11C-00-12 | N | Benzo(b)fluoranthene | 390 | 120 J | 120 J | 120 J | G2 |
| CDL-TP11C-00-12 | N | Benzo(k)fluoranthene | 390 | 45.0 J | 45.0 J | 45.0 | |
| CDL-TP11C-00-12 | N | Benzyl butyl phthalate | 390 | 160 U | 160 U | 160 UJ | G2 |
| CDL-TP11C-00-12 | N | Biphenyl (Diphenyl) | 390 | 1000 | 1000 J | 1000 | |
| CDL-TP11C-00-12 | N | bis(2-Ethylhexyl) phthalate | 390 | 160 U | 160 U | 160 UJ | G2 |
| CDL-TP11C-00-12 | N | Caprolactam | 980 | 160 S U | 160 UJ | 160 UJ | M/G2 |
| CDL-TP11C-00-12 | N | Chrysene | 390 | 76.0 J | 76.0 J | 76.0 | |
| CDL-TP11C-00-12 | N | Dibenz(a,h)anthracene | 390 | 20.0 U | 20.0 U | 20.0 UJ | G2 |
| CDL-TP11C-00-12 | N | Di-n-butyl phthalate | 390 | 65.0 J | 65.0 J | 65.0 | |
| CDL-TP11C-00-12 | N | Fluoranthene | 390 | 320 J | 320 J | 320 | |
| CDL-TP11C-00-12 | N | Fluorene | 390 | 510 | 510 J | 510 | |
| CDL-TP11C-00-12 | N | Naphthalene | 390 | 4000 | 4000 J | 4000 | |
| CDL-TP11C-00-12 | N | Pentachlorophenol | 980 | 320 U | 320 U | 320 UJ | V1 |
| CDL-TP11C-00-12 | N | Phenanthrene | 390 | 790 | 790 J | 790 J | M |
| CDL-TP11C-00-12 | N | Pyrene | 390 | 240 J | 240 J | 240 | |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| D | MS RPD |
| G1 | Initial Calibration RRF |
| G2 | Initial Calibration RSD/r^2/r |
| H1 | Test Hold Time |
| H2 | Prep Hold Time |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |
| V | Equipment Blank |
| V1 | ICV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | Trace values were found; however, the associated sample results were greater than the action level. |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | Single point calibration. |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | Compounds were found above the MDL; however, samples do not have comparable levels of interferents. No action necessary. |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised due to dilutions needed.<br><br>Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | • | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised due to dilutions needed.<br><br>Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry)

| Review Questions | Yes | No | NA | Comment |
|---|---|---|---|---|
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | see QC Outliers. An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised due to dilutions needed.<br><br>Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Tier 3**
**Initial Calibration**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Standard ID:
Analyte:

Reported Y-Intercept:
Reported Slope: 0
Reported Correlation Coefficient (r):

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | | 0 |
| Level 2 = | | 15 |
| Level 3 = | | 1000 |
| Level 4 = | | 10000 |
| Level 5 = | | |
| Level 6 = | | |
| Level 7 = | | |

Y-Intercept = #DIV/0!
Slope = #DIV/0!
r2 = #DIV/0!
r = #DIV/0!

Comments: Single point calibration.

**Tier 3**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| CCV Standard ID: | CCV1 6/19/2015 13:20 | ICV Standard ID: | ICV1 6/19/2015 12:21 |
| Analyte ID: | Manganese | Analyte ID: | Manganese |
| CCV % Rec.: | 105 | ICV % Rec.: | 94.2 |
| True CCV Conc. = | 2.5 | True CCV Conc. = | 1000 |
| Found CCV Conc. = | 2.6139 | Found CCV Conc. = | 942.2 |
| Calculated % Recovery = | 104.6 Match | Calculate( | 94.2 Match |

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| LCS ID: | QQ76828-002 | LCS/LCSD ID: | |
| Analyte ID: | Manganese | Analyte ID: | |
| Recovery: | 94 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

| | | | |
|---|---|---|---|
| Conc. LCS = | 94 | LCS Conc. = | |
| LCS Spike Conc. = | 100 | LCSD Conc. = | |
| % Recovery = | 94.0 | Match | RPD = #DIV/0! |

Comment: LCS only.

**Tier 3**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

ICSAB Standard ID: ICSAB MW-6101 6/19/2015 12:41
Analyte ID: Manganese
ICSAB % Rec.: 104

True ICSAB Conc. = 0.5
ICSAB Conc. = 0.52

Calculated % Recovery = 104 Match

Comments:

**Tier 3**
**Sample Result Verification**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

ug/L = $\frac{\text{Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor}}{\text{Initial Sample Amount (g or mL)}}$

Sample ID: **QE29016-002**

| Analyte | IDL (ug/L) | Corrected IDL (mg/kg) | Labortory Reported (mg/kg) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Amt. (g*) | % Moisture | Final Samp. Vol (mL) |
|---|---|---|---|---|---|---|---|---|---|
| Al | | 0 | **11000** | **11133** | 192.66 | 1 | 1.035 | 16.4 | 50 |
| Ba | | 0 | **39** | **39** | 0.6692 | 1 | 1.035 | 16.4 | 50 |
| Ca | | 0 | **470** | **474** | 8.1963 | 1 | 1.035 | 16.4 | 50 |
| Co | | 0 | **2.5** | **2.5** | 0.0437 | 1 | 1.035 | 16.4 | 50 |
| Cr | | 0 | **10** | **10** | 0.17265 | 1 | 1.035 | 16.4 | 50 |
| Fe | | 0 | **6600** | **6585** | 113.96 | 1 | 1.035 | 16.4 | 50 |
| K | | 0 | **500** | **498** | 8.6202 | 1 | 1.035 | 16.4 | 50 |
| Mg | | 0 | **790** | **788** | 13.63 | 1 | 1.035 | 16.4 | 50 |
| Mn | | 0 | **57** | **57** | 0.98823 | 1 | 1.035 | 16.4 | 50 |
| Na | | 0 | **37** | **37** | 0.64194 | 1 | 1.035 | 16.4 | 50 |
| Ni | | 0 | **6.1** | **6.1** | 0.10558 | 1 | 1.035 | 16.4 | 50 |
| V | | 0 | **15** | **15** | 0.26438 | 1 | 1.035 | 16.4 | 50 |
| Hg | | 0 | | **0** | | 1 | 1.035 | 16.4 | 20 |
| Ag | | 0 | **0** | **0** | | 1 | 1.035 | 16.4 | 50 |
| As | | 0 | **3** | **3** | 0.0512 | 1 | 1.035 | 16.4 | 50 |
| Be | | 0 | **0.23** | **0.2288** | 0.00396 | 1 | 1.035 | 16.4 | 50 |
| Cd | | 0 | **0.29** | **0.0289** | 0.0005 | 1 | 1.035 | 16.4 | 50 |
| Cu | | 0 | **3.7** | **3.66** | 0.0633 | 1 | 1.035 | 16.4 | 50 |
| Pb | | 0 | **15** | **15** | 0.26042 | 1 | 1.035 | 16.4 | 50 |
| Sb | | 0 | **0** | **0** | | 1 | 1.035 | 16.4 | 50 |
| | | 0 | | **0** | | 1 | 1.035 | 16.4 | 50 |
| | | 0 | | **0** | | 1 | 1.035 | 16.4 | 50 |
| | | 0 | | **0** | | 1 | 1.035 | 16.4 | 50 |

Comments: Match

**Tier 3**
**Initial Calibration**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

**Method:** SW7470A

Cal ID: 15HG0718(6/16/15)
Analyte: Mercury

Correlation Coeff 0.998526
Slope: 8.5062E-05
Intercept: -2.3960E-01

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 0 | -102 |
| Level 2 = | 1 | 11976 |
| Level 3 = | 5 | 63431 |
| Level 4 = | 10 | 128936 |
| Level 5 = | 15 | 180300 |
| Level 6 = | 20 | 231930 |
| Level 7 = | | |
| Level 8 = | | |
| Level 9 = | | |

| | | |
|---|---|---|
| Corr Coef = | 0.998526 | Matches |
| Slope = | 8.5062E-05 | Matches |
| Y-Int= | -2.3968E-01 | Matches |

Comments: Slope and Intercept not located in Lab Report.

**Tier 3**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

ICV Standard ID: ICV 15HG0720(6/16/15) - 1
Analyte ID: Hg
ICV % Rec.: 102.1

True ICV Conc. = 10.0
Found ICV Conc. = 10.2115

Calculated % D = 102.1 Matches

Comment:

**Tier 3**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

CCV Standard ID: CCV 15HG0716(6/16/15) - 1
Analyte ID: Hg
%D: 104.1

True CCV Conc. = 10.0
Found CCV Conc. = 10.4065

Calculated % D = 104.1 Match

Comment:

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A
**Matrix:** Water

---

| | | | |
|---|---|---|---|
| LCS ID: | QQ77263-002 | LCS/LCSD ID: | |
| Analyte ID: | Hg | Analyte ID: | Hg |
| Recovery: | 96 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD= $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

Conc. LCS = 0.80
LCS Spike Conc. = 0.83

LCS Conc. =
LCSD Conc. =

% Recovery = 96.4 Matches

RPD = #DIV/0! Match

Comments: LCS only.

**Tier 3**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

Sample ID: QE29016-002
Compound ID: Hg
Reported Result: 0.012 mg/kg

Conc. In Sample = $\frac{\text{(Inst Response*Slope+Y-int)*(Dilution Factor)*(Final Vol.)}}{\text{(Initial Amount)*(\% Solids*0.01)}}$

| | | Units | |
|---|---|---|---|
| Inst. Resp. = | 4304.0000 | | |
| Slope = | 0.000085 | | |
| Y-Int = | -0.239680 | | |
| Initial Amount = | 0.618 | g | |
| Dilution Factor = | 1.0 | | |
| Final Amount = | 50 | mL | |
| % Solids = | 83.6 | % | |
| Conc. In Sample = | 12.24 | ug/kg | Match |

Comments:

Comments -

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Tune ID: BFBDH 03-Jun-2015 18:49:30
Recalculated Ion Ratio: 174:95
Reported Ratio: 76.90%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 221568
Reference Mass Response = 288128

Relative Abundance = 76.90% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: VSTD050DG
Compound ID: Methylcyclohexane
Reported Result: 0.6192

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 275965
I.S. Area = 445672
Compound Conc. = 50.0
I.S. Conc. = 50

RRF = 0.6192
Matches

Calibration ID: 6/3/2015 18:08
Compound ID: Methylcyclohexane
%RSD: 4.7%
Average RRF = 0.58521

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 0.5394
RF Level 2 = 0.6032
RF Level 3 = 0.5904
RF Level 4 = 0.6192
RF Level 5 = 0.5723
RF Level 6 = 0.5867
RF Level 7 =
RF Level 8 =
RF Level 9 =
RF Level 10 =

Standard Deviation = 0.027
Average RRF = 0.5852 Matches
%RSD = 4.695 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: VSTD050FB
Compound ID: Methylcyclohexane
Reported Result: 0.620

%D Standard ID: VSTD050FB 09-Jun-2015 09:31:30
Compound ID: Methylcyclohexane
Reported %D: 5.9%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} X\ 100$$

Compound Area = 345651
I.S. Area = 557496
Compound Conc. = 50
I.S. Conc. = 50

Average RRF = 0.5852
CCV RRF = 0.620
%D = 5.9 Matches

CCV RRF = 0.620 Matches

%D Indicating Bias = -5.9

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Lab ID : QE29016-001
Compound ID: Toluene-d8
Reported Result: 86.0

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 10.81
Surr. Spike Conc. = 12.50

% Recovery = 86.5

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ76673-002 | Sample ID: | |
| Compound ID: | Methylcyclohexane | Compound ID: | |
| Recovery: | 109 | RPD: | |

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 54
LCS Spike Conc. = 50

LCS Conc. =
LCSD Conc. =

% Recovery = 108 Matches

RPD = #DIV/0!

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Sample ID: | QE29016-002 |
| Compound ID: | Methylcyclohexane |
| Reported Result: | 170000 |

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount} \times (\%\ \text{Solids} * .01)} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 194289 | Area |
| Area I.S. = | 534419 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.58521 | NA |
| Final Volume = | 5.00 | mL |
| Initial Amount = | 5.52 | |
| Dilution Factor = | 5000.0 | NA |
| % Solids = | 83.6 | |
| Conc. In Sample = | 168275 | |
| | Matches | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | DFTPPGW |
| Recalculated Ion Ratio: | 198:51 |
| Reported Ratio: | 48.3% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 30040
Reference Mass Response = 62192

Relative Abundance = 48.3% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: Ical, Level: 7
Compound ID: Naphthalene
Reported Result: 1.221

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 2337051
I.S. Area = 3063634
Compound Conc. = 25.0
I.S. Conc. = 40

RRF = 1.2205
Matches

Calibration ID: S4D70-ICC70
Compound ID: Naphthalene
%RSD: 13.00%
Average RRF = 1.375226

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 1.648
RF Level 2 = 1.549
RF Level 3 = 1.507
RF Level 4 = 1.477
RF Level 5 = 1.355
RF Level 6 = 1.295
RF Level 7 = 1.221
RF Level 8 = 1.211
RF Level 9 = 1.116

Standard Deviation = 0.179
Average RRF = 1.375 Matches
%RSD = 13.05 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: TSTD020CG
Compound ID: Naphthalene
Reported Result: 1.022

%D Standard ID: TSTD020CG
Compound ID: Naphthalene
Reported %D: 4.3%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 2138524
I.S. Area = 4185582
Compound Conc. = 20
I.S. Conc. = 40

Average RRF = 0.980
CCV RRF = 1.022
%D = -4.3 Matches

CCV RRF = 1.022 Matches

%D Indicating Bias = 4.3

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: QE29016-004
Compound ID: Phenol-d5
Reported Result: 75.00%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 14.94
Surr. Spike Conc. = 20.00

% Recovery = 74.72

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QE29016-002MS | Sample ID: | QE29016-002MS/QE29016-002MD |
| Compound ID: | Naphthalene | Compound ID: | Naphthalene |
| Recovery: | 76 | RPD: | 22 |

% Recovery = (Conc. MS - Conc. Unspiked Sample) / MS Spike Conc. X 100

RPD = |MS Conc. - MSD Conc.| / (MS Conc. + MSD Conc.)/2 X 100

Conc. MS = 7000.00
Unspiked Samp. = 4000.0
MS Spike Conc. = 4000.0

% Recovery = 75 Matches

MS Conc. = 7000.00
MSD Conc. = 5700.00

RPD = 20.5 Matches

Comments:

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QE29016
Lab: Shealy
Client: CDM Smith

Date: 11/2/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ76666-002 | Sample ID: | |
| Compound ID: | Naphthalene | Compound ID: | |
| Recovery: | 73% | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}}$ X 100

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2}$ X 100

Conc. LCS = 2400.00
LCS Spike Conc. = 3300.00

LCS Conc. =
LCSD Conc. =

% Recovery = 73 Matches

RPD = #DIV/0! Matches

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QE29016 | Date: | 11/2/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Sample ID: | QE29016-002 |
| Compound ID: | Naphthalene |
| Reported Result: | 4000 |

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor
TFA-MW291

| | | Units |
|---|---|---|
| Area Sample = | 2147642 | Area |
| Area I.S. = | 4285415 | Area |
| Conc. I.S. = | 40 | |
| Average RRF = | 0.980 | NA |
| Final Volume = | 5.0 | mL |
| Initial Amount = | 0.0304 | kg |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 83.6 | |
| Conc. In Sample = | 4025 | Matches |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q2 |
| SDG: | QF10017 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 17, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|
| CDL-TP20B-01-010 | QF10017-002 | Solid | Field Duplicate/FD | X | X | X | X |
| CDL-TP24A-01-012 | QF10017-008 | Solid | Field Duplicate/FD | X | X | X | X |
| CDL-TP18B-00-008 | QF10017-004 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP19A-00-009 | QF10017-006 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP20B-00-010 | QF10017-001 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP21B-00-007 | QF10017-003 | Solid | Field Sample/N | X | X | X | X |
| CDL-TP24A-00-012 | QF10017-007 | Solid | Field Sample/N | X | X | X | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) QF10017. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 70 results (7.52%) out of the 931 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The laboratory noted that MS/MSD recoveries were outside control limits. |
| SW7471B | No additional comments; see Checklist for detail. |
| SW8260B | The laboratory noted that MS/MSD recoveries were outside control limits. |
| SW8270D | The laboratory noted that ICV/MS/MSD recoveries were outside control limits. |

November 08, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 20, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ77434-001 (LB)/ QQ77434-001 | Copper | 0.2400 | < 0.19 | < 0.5 | mg/kg | U/None | L | |
| QQ77434-001 (LB)/ QQ77434-001 | Aluminum | 20.00 | < 6.7 | < 50 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW6010C, Field Duplicate RPD**

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QF10017-002 (N)/ QF10017-002 | Nickel | 59.74 | < 50 | < 50 | rpd | J/UJ | D3 | |
| QF10017-008 (N)/ QF10017-008 | Cadmium | 2.290 | < 0.56 | < 0.56 | mg/kg | J/UJ | D3 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Field Duplicate RPD for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | Nickel | 5.30 | 27.0 S | 27.0 J | | mg/kg | D3 |
| CDL-TP20B-01-010 | FD | Nickel | 5.80 | 50.0 | 50.0 J | | mg/kg | D3 |
| CDL-TP24A-00-012 | N | Cadmium | 0.560 | 0.910 | 0.910 J | | mg/kg | D3 |
| CDL-TP24A-01-012 | FD | Cadmium | 0.540 | 3.20 | 3.20 J | | mg/kg | D3 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Copper | 185.7 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Iron | 292.9 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Antimony | 45.65 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Aluminum | 714.3 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Zinc | 64.29 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Copper | 176.9 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Iron | 238.5 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Aluminum | 384.6 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Antimony | 51.54 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Zinc | 46.15 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | Antimony | 2.60 | 2.50 JS | 2.50 J | - | mg/kg | M/TR |
| CDL-TP20B-00-010 | N | Zinc | 6.60 | 310 S | 310 J | - | mg/kg | M |
| CDL-TP20B-01-010 | FD | Antimony | 2.90 | 3.60 | 3.60 J | - | mg/kg | M |
| CDL-TP20B-01-010 | FD | Zinc | 7.20 | 320 | 320 J | - | mg/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Serial dilution**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QF10017-001L | Arsenic | 17.70 | < 10 | < 10 | %d | J/UJ | A | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Serial dilution for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | Arsenic | 2.00 | 9.70 | 9.70 J | | mg/kg | A |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Field Duplicate RPD**

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QF10017-008 (N)/ QF10017-008 | Acetone | 39.00 | < 19 | < 19 | ug/kg | J/None | D3 | |
| QF10017-008 (N)/ QF10017-008 | Ethylbenzene | 55.56 | < 50 | < 50 | rpd | J/None | D3 | |
| QF10017-008 (N)/ QF10017-008 | Xylenes, Total | 51.97 | < 50 | < 50 | rpd | J/None | D3 | |
| QF10017-008 (N)/ QF10017-008 | Methylcyclohexane | 55.56 | < 50 | < 50 | rpd | J/None | D3 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Field Duplicate RPD for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP24A-00-012 | N | Acetone | 19.0 | 44.0 | 44.0 J | | ug/kg | D3/D |
| CDL-TP24A-00-012 | N | Ethylbenzene | 240 | 1300 | 1300 J | | ug/kg | D3 |
| CDL-TP24A-00-012 | N | Methylcyclohexane | 240 | 1300 | 1300 J | | ug/kg | D3 |
| CDL-TP24A-00-012 | N | Xylenes, Total | 240 | 9400 S | 9400 J | | ug/kg | D3 |
| CDL-TP24A-01-012 | FD | Acetone | 19.0 | 83.0 | 83.0 J | | ug/kg | D3/D |
| CDL-TP24A-01-012 | FD | Ethylbenzene | 240 | 2300 | 2300 J | | ug/kg | D3 |
| CDL-TP24A-01-012 | FD | Methylcyclohexane | 240 | 2300 | 2300 J | | ug/kg | D3 |
| CDL-TP24A-01-012 | FD | Xylenes, Total | 240 | 16000 | 16000 J | | ug/kg | D3 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ77066-002 (BS)/ QQ77066-002 | Dichlorodifluoromethane | 140.0 | 35 - 135 | 35 - 135 | percent | J/None | C | |
| QQ77148-002 (BS)/ QQ77148-002 | Dichlorodifluoromethane | 140.0 | 35 - 135 | 35 - 135 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Ethylbenzene | 55.88 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,2,4-Trichlorobenzene | 20.59 | 65 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,2-Dichlorobenzene | 33.82 | 75 - 120 | 20 - 120 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,4-Dichlorobenzene | 35.29 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,3-Dichlorobenzene | 36.76 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Styrene | 45.59 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Bromoform | 47.06 | 55 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Chlorobenzene | 51.47 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,1,2,2-Tetrachloroethane | 52.94 | 55 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Isopropylbenzene (Cumene) | 52.94 | 75 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Dibromochloromethane | 54.41 | 65 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | trans-1,3-Dichloropropene | 57.35 | 65 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Tetrachloroethene (PCE) | 57.35 | 65 - 140 | 20 - 140 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Carbon tetrachloride | 60.29 | 65 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Toluene | 60.29 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | cis-1,3-Dichloropropene | 60.29 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,2-Dibromoethane (EDB) | 60.29 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Bromodichloromethane | 61.76 | 70 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Trichloroethene (TCE) | 63.24 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,1,1-Trichloroethane | 66.18 | 70 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Benzene | 66.18 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,2-Dichloropropane | 67.65 | 70 - 120 | 20 - 120 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Chloroform | 67.65 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 1,2-Dichloroethane | 69.12 | 70 - 135 | 20 - 135 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | 1,1,1-Trichloroethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,1,2,2-Tetrachloroethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2,4-Trichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dibromoethane (EDB) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dichloroethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dichloropropane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,3-Dichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,4-Dichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Benzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Bromodichloromethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Bromoform | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Carbon tetrachloride | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Chlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Chloroform | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | cis-1,3-Dichloropropene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Dibromochloromethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Ethylbenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Isopropylbenzene (Cumene) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Styrene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Tetrachloroethene (PCE) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Toluene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | trans-1,3-Dichloropropene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Trichloroethene (TCE) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,1,1-Trichloroethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,1,2,2-Tetrachloroethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2,4-Trichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2-Dibromoethane (EDB) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2-Dichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-01-010 | FD | 1,2-Dichloroethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2-Dichloropropane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,3-Dichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,4-Dichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Benzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Bromodichloromethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Bromoform | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Carbon tetrachloride | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Chlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Chloroform | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | cis-1,3-Dichloropropene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Dibromochloromethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Ethylbenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Isopropylbenzene (Cumene) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Styrene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Tetrachloroethene (PCE) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Toluene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | trans-1,3-Dichloropropene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Trichloroethene (TCE) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QF10017-007MD (SD)/ QF10017-007MD | Methyl acetate | 38.10 | < 30 | < 30 | rpd | J/None | D | |
| QF10017-007MD (SD)/ QF10017-007MD | Acetone | 66.67 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP24A-00-012 | N | Acetone | 19.0 | 44.0 | 44.0 J | | ug/kg | D3/D |
| CDL-TP24A-01-012 | FD | Acetone | 19.0 | 83.0 | 83.0 J | | ug/kg | D3/D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP24A-00-012 (SD)/ QF10017-007MD | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 76.13 | 79 - 119 | 10 - 119 | percent | J/UJ | I | |
| CDL-TP24A-00-012 (SD)/ QF10017-007MD | Toluene-d8 | 82.10 | 85 - 116 | 10 - 116 | percent | J/UJ | I | |
| CDL-TP24A-00-012 (MS)/ QF10017-007MS | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 78.36 | 79 - 119 | 10 - 119 | percent | J/UJ | I | |
| CDL-TP24A-00-012 (MS)/ QF10017-007MS | Toluene-d8 | 82.22 | 85 - 116 | 10 - 116 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| ICV SVMS 1152 (IV) | Acenaphthylene | 122.2 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration Verification for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP21B-00-007 | N | Acenaphthylene | 380 | 66.0 J | 66.0 J | + | ug/kg | C/TR/V1 |
| CDL-TP24A-00-012 | N | Acenaphthylene | 380 | 38.0 J | 38.0 J | + | ug/kg | C/TR/V1 |
| CDL-TP24A-01-012 | FD | Acenaphthylene | 370 | 77.0 J | 77.0 J | + | ug/kg | C/TR/V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ77004-002 (BS)/ QQ77004-002 | 4-Chloroaniline | 96.01 | 10 - 95 | 10 - 95 | percent | J/None | C | |
| QQ77004-002 (BS)/ QQ77004-002 | 2,4-Dimethylphenol | 114.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ77004-002 (BS)/ QQ77004-002 | Acenaphthylene | 108.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ77192-002 (BS)/ QQ77192-002 | 4-Chloroaniline | 96.01 | 10 - 95 | 10 - 95 | percent | J/None | C | |
| QQ77192-002 (BS)/ QQ77192-002 | 2,4-Dimethylphenol | 120.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ77192-002 (BS)/ QQ77192-002 | Acenaphthylene | 105.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP21B-00-007 | N | Acenaphthylene | 380 | 66.0 J | 66.0 J | + | ug/kg | C/TR/V1 |
| CDL-TP24A-00-012 | N | 2,4-Dimethylphenol | 380 | 68.0 J | 68.0 J | + | ug/kg | C/TR |
| CDL-TP24A-00-012 | N | Acenaphthylene | 380 | 38.0 J | 38.0 J | + | ug/kg | C/TR/V1 |
| CDL-TP24A-01-012 | FD | Acenaphthylene | 370 | 77.0 J | 77.0 J | + | ug/kg | C/TR/V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Acenaphthylene | 106.4 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP20B-00-010 (SD)/ QF10017-001MD | Hexachlorocyclopentadiene | 15.22 | 20 - 134 | 10 - 134 | percent | J/UJ | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Anthracene | 106.4 | 55 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | 2,4-Dimethylphenol | 110.6 | 30 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | Acenaphthylene | 110.6 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-TP20B-00-010 (MS)/ QF10017-001MS | n-Nitrosodiphenylamine | 119.1 | 50 - 115 | 10 - 115 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | Hexachlorocyclopentadiene | 1200 | 980 S U | 980 UJ | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QF10017-001MD (SD)/ QF10017-001MD | Hexachlorocyclopentadiene | 31.33 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP20B-00-010 | N | Arsenic | 2.00 | 9.70 | 9.70 J | | mg/kg | A |
| CDL-TP20B-00-010 | N | Antimony | 2.60 | 2.50 JS | 2.50 J | - | mg/kg | M/TR |
| CDL-TP20B-00-010 | N | Zinc | 6.60 | 310 S | 310 J | - | mg/kg | M |
| CDL-TP20B-00-010 | N | Nickel | 5.30 | 27.0 S | 27.0 J | | mg/kg | D3 |
| CDL-TP20B-01-010 | FD | Antimony | 2.90 | 3.60 | 3.60 J | - | mg/kg | M |
| CDL-TP20B-01-010 | FD | Zinc | 7.20 | 320 | 320 J | - | mg/kg | M |
| CDL-TP20B-01-010 | FD | Nickel | 5.80 | 50.0 | 50.0 J | | mg/kg | D3 |
| CDL-TP24A-00-012 | N | Cadmium | 0.560 | 0.910 | 0.910 J | | mg/kg | D3 |
| CDL-TP24A-01-012 | FD | Cadmium | 0.540 | 3.20 | 3.20 J | | mg/kg | D3 |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP20B-00-010 | N | 1,1,1-Trichloroethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,1,2,2-Tetrachloroethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2,4-Trichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dibromoethane (EDB) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dichloroethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,2-Dichloropropane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,3-Dichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | 1,4-Dichlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Benzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Bromodichloromethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Bromoform | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Carbon tetrachloride | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Chlorobenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Chloroform | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | cis-1,3-Dichloropropene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Dibromochloromethane | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Ethylbenzene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Isopropylbenzene (Cumene) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Styrene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Tetrachloroethene (PCE) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Toluene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | trans-1,3-Dichloropropene | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-00-010 | N | Trichloroethene (TCE) | 9.50 | 7.60 S U | 7.60 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,1,1-Trichloroethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,1,2,2-Tetrachloroethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2,4-Trichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2-Dibromoethane (EDB) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2-Dichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,2-Dichloroethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP20B-01-010 | FD | 1,2-Dichloropropane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,3-Dichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | 1,4-Dichlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Benzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Bromodichloromethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Bromoform | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Carbon tetrachloride | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Chlorobenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Chloroform | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | cis-1,3-Dichloropropene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Dibromochloromethane | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Ethylbenzene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Isopropylbenzene (Cumene) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Styrene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Tetrachloroethene (PCE) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Toluene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | trans-1,3-Dichloropropene | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP20B-01-010 | FD | Trichloroethene (TCE) | 7.70 | 6.20 U | 6.20 UJ | - | ug/kg | M |
| CDL-TP24A-00-012 | N | Acetone | 19.0 | 44.0 | 44.0 J | | ug/kg | D3/D |
| CDL-TP24A-00-012 | N | Ethylbenzene | 240 | 1300 | 1300 J | | ug/kg | D3 |
| CDL-TP24A-00-012 | N | Methylcyclohexane | 240 | 1300 | 1300 J | | ug/kg | D3 |
| CDL-TP24A-00-012 | N | Xylenes, Total | 240 | 9400 S | 9400 J | | ug/kg | D3 |
| CDL-TP24A-01-012 | FD | Acetone | 19.0 | 83.0 | 83.0 J | | ug/kg | D3/D |
| CDL-TP24A-01-012 | FD | Ethylbenzene | 240 | 2300 | 2300 J | | ug/kg | D3 |
| CDL-TP24A-01-012 | FD | Methylcyclohexane | 240 | 2300 | 2300 J | | ug/kg | D3 |
| CDL-TP24A-01-012 | FD | Xylenes, Total | 240 | 16000 | 16000 J | | ug/kg | D3 |

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP20B-00-010 | N | Hexachlorocyclopentadiene | 1200 | 980 S U | 980 UJ | - | ug/kg | M |
| CDL-TP21B-00-007 | N | Acenaphthylene | 380 | 66.0 J | 66.0 J | + | ug/kg | C/TR/V1 |
| CDL-TP24A-00-012 | N | 2,4-Dimethylphenol | 380 | 68.0 J | 68.0 J | + | ug/kg | C/TR |
| CDL-TP24A-00-012 | N | Acenaphthylene | 380 | 38.0 J | 38.0 J | + | ug/kg | C/TR/V1 |
| CDL-TP24A-01-012 | FD | Acenaphthylene | 370 | 77.0 J | 77.0 J | + | ug/kg | C/TR/V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Table of Results with Modified Qualifiers**

| Modified Qualifiers for test method SW6010C | | | | | | | |
|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
| CDL-TP20B-00-010 | N | Arsenic | 2.00 | 9.70 | 9.70 | 9.70 J | A |

| Modified Qualifiers for test method SW8270D | | | | | | | |
|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
| CDL-TP21B-00-007 | N | Acenaphthylene | 380 | 66.0 J | 66.0 J | 66.0 J | C/TR/V1 |
| CDL-TP24A-00-012 | N | Acenaphthylene | 380 | 38.0 J | 38.0 J | 38.0 J | C/TR/V1 |
| CDL-TP24A-01-012 | FD | Acenaphthylene | 370 | 77.0 J | 77.0 J | 77.0 J | C/TR/V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| A | Serial dilution |
| C | LCS Recovery |
| D | MS RPD |
| D3 | Field Duplicate RPD |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |
| V1 | ICV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised due to dilutions needed.<br><br>Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | See QC Outliers. |

**Review Questions**

| Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised due to extraction volumes; however, all raised PQLs had detections associated |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | See QC Outliers. |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. See QC Outliers. Where instances that a compound had a high bias and associated samples were non-detect no action is required. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |

**Tier 3**
**Initial Calibration**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Standard ID:
Analyte:

Reported Y-Intercept:
Reported Slope: 0
Reported Correlation Coefficient (r):

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | | 0 |
| Level 2 = | | 15 |
| Level 3 = | | 1000 |
| Level 4 = | | 10000 |
| Level 5 = | | |
| Level 6 = | | |
| Level 7 = | | |

Y-Intercept = #DIV/0!
Slope = #DIV/0!
r2 = #DIV/0!
r = #DIV/0!

Comments: Single point calibration.

**Tier 3**
**Continuing Calibration**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

CCV Standard ID: CCV2
Analyte ID: Manganese
CCV % Rec.: 99

True CCV Conc. = 2.5
Found CCV Conc. = 2.472

Calculated % Recovery = 98.9 Match

ICV Standard ID: ICV MW-6156
Analyte ID: Manganese
ICV % Rec.: 104

True CCV Conc. = 1.25
Found CCV Conc. = 1.2947

Calculate( 103.6 Match

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| LCS ID: | QQ76828-002 | LCS/LCSD ID: | |
| Analyte ID: | Manganese | Analyte ID: | |
| Recovery: | 94 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

| | | | |
|---|---|---|---|
| Conc. LCS = | 94 | LCS Conc. = | |
| LCS Spike Conc. = | 100 | LCSD Conc. = | |
| % Recovery = | 94.0 | Match | RPD = #DIV/0! |

Comment: LCS only.

**Tier 3**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

ICSAB Standard ID: ICSAB MW-6101 6/19/2015 12:41
Analyte ID: Manganese
ICSAB % Rec.: 104

True ICSAB Conc. = 0.5
ICSAB Conc. = 0.52

Calculated % Recovery = 104.0 Match

Comments:

**Tier 3**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: QF10017-001MS
Analyte ID: Manganese
Recovery: 104

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

Conc. MS Sample = 270.00
Unspiked Samp. = 140.00
MS Spike Conc. = 130.00

% Recovery = 100.0 Match

Sample ID: QF10017-001MS/QF10017-001MD
Analyte ID: Manganese
RPD: 2.3

$$\text{RPD} = \frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$$

MS Conc. = 270
MSD Conc. = 280

RPD = 3.6% Match

**Tier 3**
**Sample Result Verification**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

ug/L = $\frac{\text{Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor}}{\text{Initial Sample Amount (g or mL)}}$

Sample ID: **QF10017-008**

| Analyte | IDL (ug/L) | Corrected IDL (mg/kg) | Labortory Reported (mg/kg) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Amt. (g*) | % Moisture | Final Samp. Vol (mL) |
|---|---|---|---|---|---|---|---|---|---|
| Al | | 0 | **11000** | **10900.6** | 100.62 | 2 | 1.061 | 13 | 50 |
| Ba | | 0 | **52** | **51.9874** | 0.47988 | 2 | 1.061 | 13 | 50 |
| Ca | | 0 | **1200** | **1220.49** | 11.266 | 2 | 1.061 | 13 | 50 |
| Co | | 0 | **2.5** | **2.46027** | 0.02271 | 2 | 1.061 | 13 | 50 |
| Cr | | 0 | **13** | **12.934** | 0.11939 | 2 | 1.061 | 13 | 50 |
| Fe | | 0 | **7400** | **7390.45** | 68.219 | 2 | 1.061 | 13 | 50 |
| K | | 0 | **520** | **516.646** | 4.769 | 2 | 1.061 | 13 | 50 |
| Mg | | 0 | **890** | **887.365** | 8.191 | 2 | 1.061 | 13 | 50 |
| Mn | | 0 | **150** | **154.04** | 1.4219 | 2 | 1.061 | 13 | 50 |
| Na | | 0 | **0** | **0** | | 2 | 1.061 | 13 | 50 |
| Ni | | 0 | **5.9** | **5.86088** | 0.0541 | 2 | 1.061 | 13 | 50 |
| V | | 0 | **16** | **16.2285** | 0.1498 | 2 | 1.061 | 13 | 50 |
| Hg | | 0 | | **0** | | 2 | 1.061 | 13 | 20 |
| Ag | | 0 | **0** | **0** | | 2 | 1.061 | 13 | 50 |
| As | | 0 | **6.7** | **6.67122** | 0.06158 | 2 | 1.061 | 13 | 50 |
| Be | | 0 | **0.24** | **0.23617** | 0.00218 | 2 | 1.061 | 13 | 50 |
| Cd | | 0 | **3.2** | **3.19586** | 0.0295 | 2 | 1.061 | 13 | 50 |
| Cu | | 0 | **13** | **13.3424** | 0.12316 | 2 | 1.061 | 13 | 50 |
| Pb | | 0 | **39** | **0** | | 2 | 1.061 | 13 | 50 |
| Sb | | 0 | **0** | **0** | | 2 | 1.061 | 13 | 50 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Comments: Match

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 6/9/2015 22:03 |
| Recalculated Ion Ratio: | 174:95 |
| Reported Ratio: | 92.10% |

Relative Abundance (Ion Ratio) = $\frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$

Target Mass Response = 338624
Reference Mass Response = 367488

Relative Abundance = 92.15% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: VSTD050FC
Compound ID: Methylcyclohexane
Reported Result: 0.5108

Calibration ID: 6/9/2015 22:33
Compound ID: Methylcyclohexane
%RSD: 10.8%
Average RRF = 0.482543

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} X\ 100$$

Compound Area = 102364
I.S. Area = 200381
Compound Conc. = 50.0
I.S. Conc. = 50

RRF = 0.5108
Matches

RF Level 1 = 0.3861
RF Level 2 = 0.4575
RF Level 3 = 0.5159
RF Level 4 = 0.5108
RF Level 5 = 0.5111
RF Level 6 = 0.5138
RF Level 7 =
RF Level 8 =
RF Level 9 =
RF Level 10 =

Standard Deviation = 0.052
Average RRF = 0.4825 Matches
%RSD = 10.824 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| RRF Standard ID: | VSTD050GU 12-Jun-2015 13:10:30 | %D Standard ID: | VSTD050GU 12-Jun-2015 13:10:30 |
| Compound ID: | Methylcyclohexane | Compound ID: | Methylcyclohexane |
| Reported Result: | 0.553 | Reported %D: | 14.5% |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}} \qquad \%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

| | | | |
|---|---|---|---|
| Compound Area = | 114010 | Average RRF = | 0.4825 |
| I.S. Area = | 206325 | CCV RRF = | 0.553 |
| Compound Conc. = | 50 | | |
| I.S. Conc. = | 50 | %D = | 14.5 Matches |
| CCV RRF = | 0.553 Matches | %D Indicating Bias = | -14.5 |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Lab ID :
Compound ID: Toluene-d8
Reported Result:

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample =
Surr. Spike Conc. =

% Recovery = #DIV/0!

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: QF10017
Lab: Empirical Laboratories
Client: ECC

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: QF10017-007MS
Compound ID: Methylcyclohexane
Recovery: 88.0

Sample ID: QF10017-007MS/QF10017-007MD
Compound ID: Methylcyclohexane
RPD: 1.1

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS = 3500
Unspiked Samp. = 1300
MS Spike Conc. = 2400

% Recovery = 91.7 Close Match

MS Conc. = 3500
MSD Conc. = 3400

RPD = 2.9 Close Match

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: QQ77195-002
Compound ID: Methylcyclohexane
Recovery: 119

Sample ID: QQ77195-002/QQ77195-003
Compound ID: Methylcyclohexane
RPD: 6%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{LCS Conc.} - \text{LCSD Conc.}|}{(\text{LCS Conc.} + \text{LCSD Conc.})/2} \times 100$$

Conc. LCS = 3000
LCS Spike Conc. = 2500

LCS Conc. = 3000.00
LCSD Conc. = 2800.00

% Recovery = 120 Matches

RPD = 6.9 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Sample ID: | QF10017-007 |
| Compound ID: | Methylcyclohexane |
| Reported Result: | 1300 |

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount} \times (\%\ \text{Solids} * .01)} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 54793 | Area |
| Area I.S. = | 204222 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.482543 | NA |
| Final Volume = | 5.00 | mL |
| Initial Amount = | 5.98 | g |
| Dilution Factor = | 50.0 | NA |
| % Solids = | 87 | % |
| Conc. In Sample = | 1336 | |
| | Matches | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 6/16/2015 8:30 |
| Recalculated Ion Ratio: | 198:51 |
| Reported Ratio: | 43.6% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 58872
Reference Mass Response = 135104

Relative Abundance = 43.6% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: Ical, Level: 7
Compound ID: Naphthalene
Reported Result: 1.220538

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 2337051
I.S. Area = 3063634
Compound Conc. = 25.0
I.S. Conc. = 40

RRF = 1.220538
Matches

Calibration ID: msd10 16-Jun-2015 09:38:30
Compound ID: Naphthalene
%RSD: 13.00%
Average RRF = 1.375266

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 1.648
RF Level 2 = 1.549
RF Level 3 = 1.507
RF Level 4 = 1.477
RF Level 5 = 1.355
RF Level 6 = 1.294588
RF Level 7 = 1.220538
RF Level 8 = 1.210646
RF Level 9 = 1.115508

Standard Deviation = 0.179
Average RRF = 1.3752256 Matches
%RSD = 13.05 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: SVMS 1139
Compound ID: Naphthalene
Reported Result: 1.283

%D Standard ID: SVMS 1139
Compound ID: Naphthalene
Reported %D: -6.7%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 2263340
I.S. Area = 3529563
Compound Conc. = 20
I.S. Conc. = 40

Average RRF = 1.375
CCV RRF = 1.283
%D = -6.7 Matches

CCV RRF = 1.283 Matches

%D Indicating Bias = 6.7

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: qf10017-001
Compound ID: Phenol-d5
Reported Result: 91%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 3030
Surr. Spike Conc. = 3333

% Recovery = 90.9
Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QF10017-001MS | Sample ID: | QF10017-001MS/QF10017-001MD |
| Compound ID: | Naphthalene | Compound ID: | Naphthalene |
| Recovery: | 74 | RPD: | 3 |

% Recovery = $\frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}}$ X 100

RPD = $\frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2}$ X 100

Conc. MS = 3500.00
Unspiked Samp. =
MS Spike Conc. = 4700.0

% Recovery = 74 Matches

MS Conc. = 3500.00
MSD Conc. = 3400.00

RPD = 2.9 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ77004-002 | Sample ID: | |
| Compound ID: | Naphthalene | Compound ID: | |
| Recovery: | 77% | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}}$ X 100

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2}$ X 100

Conc. LCS = 2600.00
LCS Spike Conc. = 3300.00

LCS Conc. =
LCSD Conc. =

% Recovery = 79 Matches

RPD = #DIV/0! Matches

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QF10017 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | |
|---|---|---|
| Sample ID: | QF10017-008 | |
| Compound ID: | Naphthalene | |
| Reported Result: | 500 | ug/kg |

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor
TFA-MW291

| | | Units |
|---|---|---|
| Area Sample = | 258214 | Area |
| Area I.S. = | 2827423 | Area |
| Conc. I.S. = | 40 | |
| Average RRF = | 1.375266 | NA |
| Final Volume = | 5000.0 | uL |
| Initial Amount = | 30.6000 | g |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 87 | |
| Conc. In Sample = | 499 | Matches |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q3 |
| SDG: | 7781_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RB1-02 | 7781003 | Water | Equipment Blank/EB | X |
| CDL-TP20B-01-010 | 7781002 | Solid | Field Duplicate/FD | X |
| CDL-TP20B-00-010 | 7781001 | Solid | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 7781_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 9 results (17.65%) out of the 51 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | The laboratory noted that MS/MSD recoveries and RPDs were outside control limits. |

November 15, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12013664 (BS)/ 12013664 | Octachlorodibenzo -p-dioxin | 100.0 | 101 - 151 | 10 - 151 | percent | J/UJ | C | |
| 12013664 (BS)/ 12013664 | 2,3,7,8-Tetrachlorodibenz ofuran | 93.50 | 95 - 126 | 10 - 126 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02 | EB | 2,3,7,8-Tetrachlorodibenzofuran | 10.8 | 7.16 U | 7.16 UJ | - | pg/l | C |
| CDL-RB1-02 | EB | Octachlorodibenzo-p-dioxin | 108 | 71.6 U | 71.6 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method E1613, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 (MS)/ 12013675 | Octachlorodibenzo-p-dioxin | 4830 | 93 - 162 | 10 - 162 | percent | J/None | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (SD)/ 12013675 | Octachlorodibenzo-p-dioxin | 7.850 | 93 - 162 | 10 - 162 | percent | J/UJ | M | Spike amount Insignificant |
| CDL-TP20B-00-010 (MS)/ 12013675 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 239.0 | 93 - 144 | 10 - 144 | percent | J/None | M | |
| CDL-TP20B-00-010 (SD)/ 12013676 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 57.80 | 93 - 144 | 10 - 144 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 4.89 | 46.6 | 46.6 J | + | pg/g | M/D |
| CDL-TP20B-01-010 | FD | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 4.84 | 59.5 | 59.5 J | + | pg/g | M/D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method E1613, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12013676 (SD)/ 12013676 | Octachlorodibenzo-p-dioxin | 122.5 | < 20 | < 20 | rpd | J/None | D | |
| 12013676 (SD)/ 12013676 | 2,3,7,8-Tetrachlorodibenzofuran | 22.50 | < 20 | < 20 | rpd | J/None | D | |
| 12013676 (SD)/ 12013676 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 57.47 | < 20 | < 20 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP20B-00-010 | N | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 4.89 | 46.6 | 46.6 J | + | pg/g | M/D |
| CDL-TP20B-00-010 | N | 2,3,7,8-Tetrachlorodibenzofuran | 0.978 | 2.30 | 2.30 J | | pg/g | D |
| CDL-TP20B-00-010 | N | Octachlorodibenzo-p-dioxin | 9.78 | 2960 | 2960 J | | pg/g | D |
| CDL-TP20B-01-010 | FD | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 4.84 | 59.5 | 59.5 J | + | pg/g | M/D |
| CDL-TP20B-01-010 | FD | 2,3,7,8-Tetrachlorodibenzofuran | 0.968 | 2.50 | 2.50 J | | pg/g | D |
| CDL-TP20B-01-010 | FD | Octachlorodibenzo-p-dioxin | 9.68 | 3750 | 3750 J | | pg/g | D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: E1613 | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-RB1-02 | EB | 2,3,7,8-Tetrachlorodibenzofuran | 10.8 | 7.16 U | 7.16 UJ | - | pg/l | C |
| CDL-RB1-02 | EB | Octachlorodibenzo-p-dioxin | 108 | 71.6 U | 71.6 UJ | - | pg/l | C |

| Test Method: E1613 | Extraction Method: SW3540C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP20B-00-010 | N | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 4.89 | 46.6 | 46.6 J | + | pg/g | M/D |
| CDL-TP20B-00-010 | N | 2,3,7,8-Tetrachlorodibenzofuran | 0.978 | 2.30 | 2.30 J | | pg/g | D |
| CDL-TP20B-00-010 | N | Octachlorodibenzo-p-dioxin | 9.78 | 2960 | 2960 J | | pg/g | D |
| CDL-TP20B-01-010 | FD | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 4.84 | 59.5 | 59.5 J | + | pg/g | M/D |
| CDL-TP20B-01-010 | FD | 2,3,7,8-Tetrachlorodibenzofuran | 0.968 | 2.50 | 2.50 J | | pg/g | D |
| CDL-TP20B-01-010 | FD | Octachlorodibenzo-p-dioxin | 9.68 | 3750 | 3750 J | | pg/g | D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| D | MS RPD |
| M | MS Recovery |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | | | • | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 7781
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: A22APR15B-5
Compound ID: 2378-TCDF
Reported Result: 0.8360

Calibration ID: 22 Apr 2017 20:57:11
Compound ID: 2378-TCDF
%RSD: 4.72011%
Average RRF = 0.90453

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

Compound Area = 38700
I.S. Area = 2320000
Compound Conc. = 2.0
I.S. Conc. = 100

RRF = 0.8341
Matches

RF Level 1 = 0.926
RF Level 2 = 0.836
RF Level 3 = 0.889
RF Level 4 = 0.933
RF Level 5 = 0.938
RF Level 6 =
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.043
Average RRF = 0.904 Matches
%RSD = 4.73301 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: 7781
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: d01jul15a-6
Compound ID: 2378-TCDF
Reported Result: 0.932

Standard ID: d01jul15a-6
Compound ID: 2378-TCDF
Reported %D: 1.8%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 169000
I.S. Area = 1810000
Compound Conc. = 10
I.S. Conc. = 100

Average RRF = 0.932
CCV RRF = 0.915
%D = 1.82 Matches

CCV RRF = 0.934 Matches

%D Indicating Bias = -1.8

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: 7781
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 7781001
Compound ID: 13C-2,3,7,8-TCDD
Reported Result: 81.0%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 158.00
Surr. Spike Conc. = 196.00

% Recovery = 80.6 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: 7781
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | 12013675 | Sample ID: | 12013676/12013676 |
| Compound ID: | 2378-TCDF | Compound ID: | 2378-TCDF |
| Recovery: | 107 | RPD: | 18.900 |

% Recovery = $\frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$

RPD = $\frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$

Conc. MS = 23.3
Unspiked Samp. =
MS Spike Conc. = 19.6

% Recovery = 119 Matches

MS Conc. = 23.3
MSD Conc. = 19.3

RPD = 18.779 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 7781
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 12013664
Compound ID: 2378-TCDF
Recovery: 93.3%

Sample ID: 12013664
Compound ID: 2378-TCDF
RPD: 5.00%

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X

Conc. LCS = 187
LCS Spike Conc. = 200

LCS Conc. = 187
LCSD Conc. = 196

% Recovery = 93.5 Matches

RPD = 4.70 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 7781 | Date: | 11/15/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: 7781001
Compound ID: OCDD
Reported Result: 2960 pg/g

Conc. In Sample = $\frac{\text{Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor}}{\text{Area IS X RF X Initial Volume}}$

| | | Units |
|---|---|---|
| Area Sample = | 6420000 | Area |
| Area I.S. = | 847000 | Area |
| Conc. I.S. = | 100 | |
| Average RRF = | 1.0010 | |
| Final Volume = | 0.040 | mL |
| Initial Amount = | 15.1500 | g |
| Dilution Factor = | 1.0 | NA |
| Moisture= | 32.529 | |
| Conc. In Sample = | 2.963 | |
| | Matches | |

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q3 |
| SDG: | QG23025 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | January 18, 2018 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A | SW7470A - Dissolved | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|---|
| CDL-DPS01-00-027 | QG23025-001 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-DPS02-00-020 | QG23025-007 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-DPS03-00-010 | QG23025-009 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-DPS06-00-014 | QG23025-012 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-DPS08-00-010 | QG23025-014 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-DPS08-01-010 | QG23025-015 | Solid | Field Duplicate/FD | X | | | | X | X | X |
| CDL-DPS10-00-016 | QG23025-003 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-DPW01-00-3039 | QG23025-002 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW02-00-2130 | QG23025-008 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW03-00-1120 | QG23025-010 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW03-01-1120 | QG23025-011 | Water | Field Duplicate/FD | | X | | X | | X | X |
| CDL-DPW04-00-1928 | QG23025-017 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW04-01-1928 | QG23025-018 | Water | Field Duplicate/FD | | X | | X | | X | X |
| CDL-DPW06-00-1130 | QG23025-013 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW09-00-4150 | QG23025-019 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW10-00-1726 | QG23025-004 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-RB1-02b | QG23025-006 | Water | Equipment Blank/EB | X | | X | | | X | X |
| CDL-TB1-03 | QG23025-005 | Water | Trip Blank/TB | | | | | | X | |
| CDL-TB1-03-2 | QG23025-016 | Water | Trip Blank/TB | | | | | | X | |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A | SW7470A - Dissolved | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|---|
| CDL-TB2-03 | QG23025-020 | Water | Trip Blank/TB | | | | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) QG23025. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

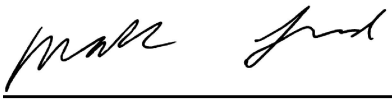
- Blank
- Blank - Negative
- Equipment Blank
- Field Duplicate RPD
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 162 results (6.74%) out of the 2402 results (sample and field QC samples) reported are qualified based on review and 2 results (0.08%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The laboratory noted that MS/MSD recoveries were outside control limits. Additionally, samples were diluted due to sample matrix. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW7471B | No additional comments; see Checklist for detail. |
| SW8260B | The laboratory noted that surrogate/CCV/internal standards were outside control limits. |
| SW8270D | The laboratory noted that ICV/LCS/MS/MSD recoveries were outside control limits. |



January 18, 2018

Reviewed by Mark Lund, Project Scientist, Synectics,
Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80806-001 (LB)/ QQ80806-001 | Aluminum | 23.00 | < 6.7 | < 50 | mg/kg | U/None | L | |
| QQ80806-001 (LB)/ QQ80806-001 | Copper | 0.3700 | < 0.19 | < 0.5 | mg/kg | U/None | L | |
| QQ80806-001 (LB)/ QQ80806-001 | Potassium | 22.00 | < 19 | < 250 | mg/kg | U/None | L | |
| QQ80806-001 (LB)/ QQ80806-001 | Calcium | 34.00 | < 24 | < 250 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS01-00-027 | N | Calcium | 270 | 180 BJ | 270 U | + | mg/kg | L |
| CDL-DPS01-00-027 | N | Copper | 0.530 | 2.40 B | 2.40 J | + | mg/kg | L |
| CDL-DPS01-00-027 | N | Potassium | 270 | 240 BJ | 270 U | + | mg/kg | L |
| CDL-DPS03-00-010 | N | Copper | 0.530 | 2.30 B | 2.30 J | + | mg/kg | L |
| CDL-DPS03-00-010 | N | Potassium | 270 | 210 BJ | 270 U | + | mg/kg | L |
| CDL-DPS06-00-014 | N | Calcium | 1500 | 1000 BJ | 1500 U | + | mg/kg | L |
| CDL-DPS06-00-014 | N | Potassium | 1500 | 300 BJ | 1500 U | + | mg/kg | L |
| CDL-DPS08-00-010 | N | Calcium | 1500 | 1600 BS | 1600 J | + | mg/kg | L |
| CDL-DPS08-00-010 | N | Potassium | 1500 | 590 BJS | 1500 U | + | mg/kg | L |
| CDL-DPS08-01-010 | FD | Calcium | 1600 | 1800 B | 1800 J | + | mg/kg | L |
| CDL-DPS08-01-010 | FD | Potassium | 1600 | 610 BJ | 1600 U | + | mg/kg | L |
| CDL-DPS10-00-016 | N | Calcium | 270 | 190 BJ | 270 U | + | mg/kg | L |
| CDL-DPS10-00-016 | N | Copper | 0.540 | 2.50 B | 2.50 J | + | mg/kg | L |
| CDL-DPS10-00-016 | N | Potassium | 270 | 220 BJ | 270 U | + | mg/kg | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Field Duplicate RPD**

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QG23025-015 (N)/ QG23025-015 | Arsenic | 21.70 | < 4.5 | < 4.5 | mg/kg | J/UJ | D3 | |
| QG23025-015 (N)/ QG23025-015 | Manganese | 65.42 | < 50 | < 50 | rpd | J/UJ | D3 | |
| QG23025-015 (N)/ QG23025-015 | Iron | 167.8 | < 50 | < 50 | rpd | J/UJ | D3 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Field Duplicate RPD for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS08-00-010 | N | Arsenic | 4.50 | 31.0 | 31.0 J | | mg/kg | D3 |
| CDL-DPS08-00-010 | N | Iron | 61.0 | 160000 S | 160000 J | | mg/kg | D3 |
| CDL-DPS08-00-010 | N | Manganese | 4.50 | 710 S | 710 J | | mg/kg | D3 |
| CDL-DPS08-01-010 | FD | Arsenic | 4.70 | 9.30 | 9.30 J | | mg/kg | D3 |
| CDL-DPS08-01-010 | FD | Iron | 31.0 | 14000 | 14000 J | | mg/kg | D3 |
| CDL-DPS08-01-010 | FD | Manganese | 4.70 | 360 | 360 J | | mg/kg | D3 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Manganese | -153.8 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Magnesium | 146.2 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Aluminum | 3000 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Zinc | 384.6 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Chromium | 128.8 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Iron | -14400 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Copper | -1615 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Lead | 131.3 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Antimony | 4.615 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Manganese | -216.7 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Magnesium | 150.0 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Aluminum | 2250 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Iron | -14600 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Copper | -2333 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Nickel | 146.7 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Antimony | 14.75 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Lead | 140.0 | 75 - 125 | 30 - 125 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS08-00-010 | N | Chromium | 3.00 | 88.0 S | 88.0 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Lead | 6.10 | 780 S | 780 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Magnesium | 1500 | 1800 S | 1800 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Antimony | 12.0 | 30.0 S | 30.0 J | - | mg/kg | M |
| CDL-DPS08-00-010 | N | Nickel | 24.0 | 94.0 S | 94.0 J | + | mg/kg | M |

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS08-01-010 | FD | Chromium | 3.10 | 140 | 140 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Lead | 3.10 | 680 | 680 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Magnesium | 1600 | 2500 | 2500 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Antimony | 6.30 | 8.50 | 8.50 J | - | mg/kg | M |
| CDL-DPS08-01-010 | FD | Nickel | 13.0 | 81.0 | 81.0 J | + | mg/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ81169-001 (LB)/ QQ81169-001 | Cobalt | 0.001800 | < 0.0013 | < 0.025 | mg/l | U/None | L | |
| QQ81169-001 (LB)/ QQ81169-001 | Zinc | 0.004900 | < 0.0022 | < 0.02 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80979-001 (LB)/ QQ80979-001 | Acetone | 5.200 | < 5.1 | < 20 | ug/kg | U/None | L | |
| QQ81212-001 (LB)/ QQ81212-001 | Methylene chloride | 1.600 | < 1.2 | < 5 | ug/kg | U/None | L | |
| QQ81212-001 (LB)/ QQ81212-001 | 4-Methyl-2-pentanone (MIBK) | 4.400 | < 3.6 | < 10 | ug/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS06-00-014 | N | Methylene chloride | 5.40 | 2.30 BJ | 5.40 U | + | ug/kg | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Field Duplicate RPD**

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QG23025-011 (N)/ QG23025-011 | Toluene | 34.04 | < 30 | < 30 | rpd | J/None | D3 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Field Duplicate RPD for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW03-00-1120 | N | Toluene | 50.0 | 390 | 390 J | | ug/l | D3 |
| CDL-DPW03-01-1120 | FD | Toluene | 50.0 | 550 | 550 J | | ug/l | D3 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS01-00-027 (N)/ QG23025-001 | Toluene-d8 | 123.1 | 85 - 116 | 10 - 116 | percent | J/None | I | |
| CDL-DPS01-00-027 (N)/ QG23025-001 | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 172.4 | 79 - 119 | 10 - 119 | percent | J/None | I | |
| CDL-DPS02-00-020 (N)/ QG23025-007 | Toluene-d8 | 126.2 | 85 - 116 | 10 - 116 | percent | J/None | I | |
| CDL-DPS03-00-010 (N)/ QG23025-009DU | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 135.0 | 79 - 119 | 10 - 119 | percent | J/None | I | |
| CDL-DPS03-00-010 (N)/ QG23025-009DU | 1,2-Dichloroethane-d4 | 139.8 | 71 - 136 | 10 - 136 | percent | J/None | I | |
| CDL-DPS03-00-010 (N)/ QG23025-009DU | Dibromofluoromethane | 146.6 | 78 - 119 | 10 - 119 | percent | J/None | I | |
| CDL-DPS03-00-010 (N)/ QG23025-009DU | Toluene-d8 | 150.4 | 85 - 116 | 10 - 116 | percent | J/None | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS01-00-027 | N | Benzene | 5700 | 3000 JQ | 3000 J | + | ug/kg | I/TR |
| CDL-DPS01-00-027 | N | Ethylbenzene | 5700 | 2400 JQ | 2400 J | + | ug/kg | I/TR |
| CDL-DPS01-00-027 | N | Isopropylbenzene (Cumene) | 5700 | 4600 JQ | 4600 J | + | ug/kg | I/TR |
| CDL-DPS01-00-027 | N | Xylenes, Total | 5700 | 25000 Q | 25000 J | + | ug/kg | I |
| CDL-DPS02-00-020 | N | 2-Butanone (MEK) | 13.0 | 11.0 JQ | 11.0 J | + | ug/kg | I/TR/S |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Trip Blank**

The purpose of trip blanks is to determine the existence and magnitude of cross-contamination problems resulting from the shipping of samples. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in trip blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03 (TB)/ QG23025-005 | Acetone | 1.800 | < 1.6 | < 20 | ug/l | U/None | T | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Trip Blank for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW10-00-1726 | N | Acetone | 20.0 | 1.90 J | 20.0 U | + | ug/l | T |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Field Duplicate RPD**

Field duplicate analyses are performed in order to assess sample collection/laboratory precision for each sample matrix. Summary forms were evaluated and compared to electronic data deliverables. Field duplicate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QG23025-011 (N)/ QG23025-011 | Fluorene | 1.400 | < 0.2 | < 0.2 | ug/l | J/None | D3 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Field Duplicate RPD for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW03-00-1120 | N | Fluorene | 0.200 | 1.40 | 1.40 J | | ug/l | D3 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80709-002 (BS)/ QQ80709-002 | Acetophenone | 105.0 | 39 - 100 | 39 - 100 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | 4-Nitroaniline | 125.0 | 35 - 120 | 35 - 120 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Benzyl butyl phthalate | 130.0 | 45 - 115 | 45 - 115 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | n-Nitrosodiphenylamine | 130.0 | 50 - 110 | 50 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Caprolactam | 140.0 | 20 - 100 | 20 - 100 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Acenaphthylene | 150.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Dibenz (a,h)anthracene | 310.0 | 40 - 125 | 40 - 125 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Anthracene | 115.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Carbazole | 120.0 | 50 - 115 | 50 - 115 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Chrysene | 120.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Benzo(a)pyrene | 125.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Hexachlorocyclopentadiene | 9.500 | 20 - 123 | 20 - 123 | percent | J/UJ | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Indeno(1,2,3-c,d)pyrene | 140.0 | 45 - 125 | 45 - 125 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW01-00-3039 | N | Anthracene | 0.200 | 1.60 | 1.60 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Benzo(a)pyrene | 0.200 | 0.340 | 0.340 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Carbazole | 1.00 | 9.10 | 9.10 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Chrysene | 0.200 | 0.330 | 0.330 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW01-00-3039 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.130 JL | 0.130 J | + | ug/l | C/TR |
| CDL-DPW02-00-2130 | N | Carbazole | 1.00 | 7.20 | 7.20 J | + | ug/l | C |
| CDL-DPW02-00-2130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW03-00-1120 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW03-01-1120 | FD | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW04-00-1928 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW04-01-1928 | FD | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW06-00-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW09-00-4150 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW10-00-1726 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-RB1-02b | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80689-002 (BS)/ QQ80689-002 | Diethyl phthalate | 105.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | n-Nitrosodiphenylamine | 117.0 | 50 - 115 | 50 - 115 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | 4-Nitroaniline | 126.0 | 35 - 115 | 35 - 115 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Caprolactam | 129.0 | 45 - 122 | 45 - 122 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Acenaphthylene | 132.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | 2,4-Dimethylphenol | 138.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Anthracene | 105.0 | 55 - 105 | 55 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Benzo(a)pyrene | 117.0 | 50 - 110 | 50 - 110 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS01-00-027 | N | Anthracene | 380 | 1800 | 1800 J | + | ug/kg | C |
| CDL-DPS01-00-027 | N | Benzo(a)pyrene | 380 | 670 | 670 J | + | ug/kg | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Benzo(a)pyrene | 116.3 | 50 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | n-Nitrosodiphenylamine | 116.3 | 50 - 115 | 10 - 115 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Acenaphthylene | 130.2 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Caprolactam | 132.6 | 45 - 122 | 10 - 122 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | 2,4-Dimethylphenol | 139.5 | 30 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-DPS08-00-010 (SD)/ QG23025-014MD | Hexachlorocyclopentadiene | 4.651 | 20 - 134 | 10 - 134 | percent | J/R | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Acenaphthylene | 116.3 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | 2,4-Dimethylphenol | 123.3 | 30 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | 2,4-Dichlorophenol | 153.5 | 45 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-DPS08-00-010 (MS)/ QG23025-014MS | Hexachlorocyclopentadiene | 3.256 | 20 - 134 | 10 - 134 | percent | J/R | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS08-00-010 | N | Hexachlorocyclopentadiene | 1100 | 890 S U | 890 R | - | ug/kg | M |
| CDL-DPS08-01-010 | FD | Hexachlorocyclopentadiene | 1100 | 890 U | 890 R | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QG23025-014MD (SD)/ QG23025-014MD | Hexachlorocyclopentadiene | 35.29 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW03-00-1120 (N)/ QG23025-010 | Terphenyl-d14 | 43.10 | 50 - 134 | 10 - 134 | percent | J/UJ | I | Diluted Out |
| CDL-DPW03-01-1120 (FD)/ QG23025-011 | Nitrobenzene-d5 | 139.3 | 44 - 120 | 10 - 120 | percent | J/None | I | Diluted Out |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS01-00-027 | N | Calcium | 270 | 180 BJ | 270 U | + | mg/kg | L |
| CDL-DPS01-00-027 | N | Copper | 0.530 | 2.40 B | 2.40 J | + | mg/kg | L |
| CDL-DPS01-00-027 | N | Potassium | 270 | 240 BJ | 270 U | + | mg/kg | L |
| CDL-DPS03-00-010 | N | Copper | 0.530 | 2.30 B | 2.30 J | + | mg/kg | L |
| CDL-DPS03-00-010 | N | Potassium | 270 | 210 BJ | 270 U | + | mg/kg | L |
| CDL-DPS06-00-014 | N | Calcium | 1500 | 1000 BJ | 1500 U | + | mg/kg | L |
| CDL-DPS06-00-014 | N | Potassium | 1500 | 300 BJ | 1500 U | + | mg/kg | L |
| CDL-DPS08-00-010 | N | Chromium | 3.00 | 88.0 S | 88.0 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Lead | 6.10 | 780 S | 780 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Magnesium | 1500 | 1800 S | 1800 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Antimony | 12.0 | 30.0 S | 30.0 J | - | mg/kg | M |
| CDL-DPS08-00-010 | N | Nickel | 24.0 | 94.0 S | 94.0 J | + | mg/kg | M |
| CDL-DPS08-00-010 | N | Arsenic | 4.50 | 31.0 | 31.0 J | | mg/kg | D3 |
| CDL-DPS08-00-010 | N | Iron | 61.0 | 160000 S | 160000 J | | mg/kg | D3 |
| CDL-DPS08-00-010 | N | Manganese | 4.50 | 710 S | 710 J | | mg/kg | D3 |
| CDL-DPS08-00-010 | N | Calcium | 1500 | 1600 BS | 1600 J | + | mg/kg | L |
| CDL-DPS08-00-010 | N | Potassium | 1500 | 590 BJS | 1500 U | + | mg/kg | L |
| CDL-DPS08-01-010 | FD | Chromium | 3.10 | 140 | 140 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Lead | 3.10 | 680 | 680 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Magnesium | 1600 | 2500 | 2500 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Antimony | 6.30 | 8.50 | 8.50 J | - | mg/kg | M |
| CDL-DPS08-01-010 | FD | Nickel | 13.0 | 81.0 | 81.0 J | + | mg/kg | M |
| CDL-DPS08-01-010 | FD | Arsenic | 4.70 | 9.30 | 9.30 J | | mg/kg | D3 |
| CDL-DPS08-01-010 | FD | Iron | 31.0 | 14000 | 14000 J | | mg/kg | D3 |
| CDL-DPS08-01-010 | FD | Manganese | 4.70 | 360 | 360 J | | mg/kg | D3 |
| CDL-DPS08-01-010 | FD | Calcium | 1600 | 1800 B | 1800 J | + | mg/kg | L |
| CDL-DPS08-01-010 | FD | Potassium | 1600 | 610 BJ | 1600 U | + | mg/kg | L |
| CDL-DPS10-00-016 | N | Calcium | 270 | 190 BJ | 270 U | + | mg/kg | L |
| CDL-DPS10-00-016 | N | Copper | 0.540 | 2.50 B | 2.50 J | + | mg/kg | L |
| CDL-DPS10-00-016 | N | Potassium | 270 | 220 BJ | 270 U | + | mg/kg | L |

| Test Method: SW8260B | Extraction Method: SW5030B | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW03-00-1120 | N | Toluene | 50.0 | 390 | 390 J | | ug/l | D3 |
| CDL-DPW03-01-1120 | FD | Toluene | 50.0 | 550 | 550 J | | ug/l | D3 |
| CDL-DPW10-00-1726 | N | Acetone | 20.0 | 1.90 J | 20.0 U | + | ug/l | T |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS01-00-027 | N | Benzene | 5700 | 3000 JQ | 3000 J | + | ug/kg | I/TR |
| CDL-DPS01-00-027 | N | Ethylbenzene | 5700 | 2400 JQ | 2400 J | + | ug/kg | I/TR |
| CDL-DPS01-00-027 | N | Isopropylbenzene (Cumene) | 5700 | 4600 JQ | 4600 J | + | ug/kg | I/TR |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS01-00-027 | N | Xylenes, Total | 5700 | 25000 Q | 25000 J | + | ug/kg | I |
| CDL-DPS02-00-020 | N | 2-Butanone (MEK) | 13.0 | 11.0 JQ | 11.0 J | + | ug/kg | I/TR/S |
| CDL-DPS06-00-014 | N | Methylene chloride | 5.40 | 2.30 BJ | 5.40 U | + | ug/kg | L |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW01-00-3039 | N | Anthracene | 0.200 | 1.60 | 1.60 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Benzo(a)pyrene | 0.200 | 0.340 | 0.340 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Carbazole | 1.00 | 9.10 | 9.10 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Chrysene | 0.200 | 0.330 | 0.330 J | + | ug/l | C |
| CDL-DPW01-00-3039 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW01-00-3039 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.130 JL | 0.130 J | + | ug/l | C/TR |
| CDL-DPW02-00-2130 | N | Carbazole | 1.00 | 7.20 | 7.20 J | + | ug/l | C |
| CDL-DPW02-00-2130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW03-00-1120 | N | Fluorene | 0.200 | 1.40 | 1.40 J | | ug/l | D3 |
| CDL-DPW03-00-1120 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW03-01-1120 | FD | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW04-00-1928 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW04-01-1928 | FD | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW06-00-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW09-00-4150 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW10-00-1726 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-RB1-02b | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS01-00-027 | N | Anthracene | 380 | 1800 | 1800 J | + | ug/kg | C |
| CDL-DPS01-00-027 | N | Benzo(a)pyrene | 380 | 670 | 670 J | + | ug/kg | C |
| CDL-DPS08-00-010 | N | Hexachlorocyclopentadiene | 1100 | 890 S U | 890 R | - | ug/kg | M |
| CDL-DPS08-01-010 | FD | Hexachlorocyclopentadiene | 1100 | 890 U | 890 R | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-DPS02-00-020 | N | 1,1,1-Trichloroethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,1,2,2-Tetrachloroethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,1,2-Trichloroethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,1-Dichloroethene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,2,4-Trichlorobenzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,2-Dibromo-3-chloropropane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,2-Dibromoethane (EDB) | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,2-Dichlorobenzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,2-Dichloroethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,2-Dichloropropane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,3-Dichlorobenzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 1,4-Dichlorobenzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | 2-Butanone (MEK) | 13.0 | 11.0 JQ | 11.0 J | 11.0 J | I/TR/S |
| CDL-DPS02-00-020 | N | 2-Hexanone | 13.0 | 10.0 Q U | 10.0 U | 10.0 UJ | S |
| CDL-DPS02-00-020 | N | 4-Methyl-2-pentanone (MIBK) | 13.0 | 10.0 Q U | 10.0 U | 10.0 UJ | S |
| CDL-DPS02-00-020 | N | Acetone | 25.0 | 10.0 Q U | 10.0 U | 10.0 UJ | S |
| CDL-DPS02-00-020 | N | Benzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Bromodichloromethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Bromoform | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Bromomethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Carbon disulfide | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Carbon tetrachloride | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Chlorobenzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Chloroethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Chloroform | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Chloromethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | cis-1,2-Dichloroethene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | cis-1,3-Dichloropropene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Cyclohexane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Dibromochloromethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Dichlorodifluoromethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Ethylbenzene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Isopropylbenzene (Cumene) | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Methyl acetate | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Methyl tert-butyl ether (MTBE) | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Methylcyclohexane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Methylene chloride | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Styrene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-DPS02-00-020 | N | Tetrachloroethene (PCE) | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Toluene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | trans-1,2-Dichloroethene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | trans-1,3-Dichloropropene | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Trichloroethene (TCE) | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Trichlorofluoromethane | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Vinyl chloride | 6.30 | 5.00 Q U | 5.00 U | 5.00 UJ | S |
| CDL-DPS02-00-020 | N | Xylenes, Total | 6.30 | 10.0 Q U | 10.0 U | 10.0 UJ | S |
| CDL-DPS10-00-016 | N | 1,1,1-Trichloroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,1,2,2-Tetrachloroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,1,2-Trichloroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,1-Dichloroethene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,2,4-Trichlorobenzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,2-Dibromo-3-chloropropane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,2-Dibromoethane (EDB) | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,2-Dichlorobenzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,2-Dichloroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,2-Dichloropropane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,3-Dichlorobenzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 1,4-Dichlorobenzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | 2-Butanone (MEK) | 11.0 | 8.80 U | 8.80 U | 8.80 UJ | S |
| CDL-DPS10-00-016 | N | 2-Hexanone | 11.0 | 8.80 U | 8.80 U | 8.80 UJ | S |
| CDL-DPS10-00-016 | N | 4-Methyl-2-pentanone (MIBK) | 11.0 | 8.80 U | 8.80 U | 8.80 UJ | S |
| CDL-DPS10-00-016 | N | Acetone | 21.0 | 8.40 U | 8.40 U | 8.40 UJ | S |
| CDL-DPS10-00-016 | N | Benzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Bromodichloromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Bromoform | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Bromomethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Carbon disulfide | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Carbon tetrachloride | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Chlorobenzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Chloroethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Chloroform | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Chloromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | cis-1,2-Dichloroethene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | cis-1,3-Dichloropropene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Cyclohexane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Dibromochloromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Dichlorodifluoromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Ethylbenzene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-DPS10-00-016 | N | Isopropylbenzene (Cumene) | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Methyl acetate | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Methyl tert-butyl ether (MTBE) | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Methylcyclohexane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Methylene chloride | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Styrene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Tetrachloroethene (PCE) | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Toluene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | trans-1,2-Dichloroethene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | trans-1,3-Dichloropropene | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Trichloroethene (TCE) | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Trichlorofluoromethane | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Vinyl chloride | 5.30 | 4.20 U | 4.20 U | 4.20 UJ | S |
| CDL-DPS10-00-016 | N | Xylenes, Total | 5.30 | 8.50 U | 8.50 U | 8.50 UJ | S |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| D | MS RPD |
| D3 | Field Duplicate RPD |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| S | Internal standard |
| T | Trip Blank |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Calibration blank? | | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised due to dilutions. Various compound are reported non-detect at levels greater than the project PQLs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | See QC Outliers. |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detect results at levels greater than the project PQLs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detect results at levels greater than the project PQLs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | See Qualified Results. |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | Freon, cyclohexane and methylcyclohexane had a high bias and the associated samples were non-detect. No action required. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detect results at levels greater than the project PQLs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | See QC Outliers. |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry)

| Review Questions | Yes | No | NA | Comment |
|---|---|---|---|---|
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | ICV were outside control with a high bias; however, the associated samples were non-detect and no action is required. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detect results at levels greater than the project PQLs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | See QC Outliers. |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q3 |
| SDG: | QG29026 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 22, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A - Dissolved | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|
| CDL-DPS07-00-002 | QG29026-003 | Solid | Field Sample/N | X | | | X | X | X |
| CDL-DPS11-00-019 | QG29026-001 | Solid | Field Sample/N | X | | | X | X | X |
| CDL-DPW07-1130 | QG29026-004 | Water | Field Sample/N | | X | X | | X | X |
| CDL-DPW11-00-2130 | QG29026-002 | Water | Field Sample/N | | X | X | | X | X |
| CDL-TB1-03 | QG29026-005 | Water | Trip Blank/TB | | | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) QG29026. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 54 results (9.33%) out of the 579 results (sample and field QC samples) reported are qualified based on review and 1 results (0.17%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | No additional comments; see Checklist for detail. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW8260B | The laboratory indicated the following issues:<br><br>Sample 003 failed surrogate and internal recovery due to matrix interference. This was confirmed with a second run.<br><br>The method blank in batch 81567 had a detection of 2-hexanone at 5.2. All DoD samples were ND for 2-hexanone. |
| SW8270D | The laboratory noted that ICV/CCV/LCS recoveries were outside control limits. |

November 05, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

January 11, 2018

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS11-00-019 (SD)/ QG29026-001MD | Aluminum | 272.7 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-DPS11-00-019 (SD)/ QG29026-001MD | Iron | 9.091 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-DPS11-00-019 (SD)/ QG29026-001MD | Antimony | 38.18 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-DPS11-00-019 (MS)/ QG29026-001MS | Aluminum | 333.3 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-DPS11-00-019 (MS)/ QG29026-001MS | Antimony | 39.66 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-DPS11-00-019 (MS)/ QG29026-001MS | Selenium | 74.14 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-DPS11-00-019 (MS)/ QG29026-001MS | Arsenic | 74.86 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS11-00-019 | N | Antimony | 1.10 | 0.830 S U | 0.830 UJ | - | mg/kg | M |
| CDL-DPS11-00-019 | N | Arsenic | 0.800 | 2.60 | 2.60 J | - | mg/kg | M |
| CDL-DPS11-00-019 | N | Selenium | 1.10 | 0.880 U | 0.880 UJ | - | mg/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ81566-001 (LB)/ QQ81566-001 | 2-Hexanone | 5.300 | < 3.8 | < 10 | ug/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW07-1130 (SD)/ QG29026-004MD | Styrene | 56.00 | 65 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-DPW07-1130 (MS)/ QG29026-004MS | Styrene | 60.00 | 65 - 135 | 20 - 135 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW07-1130 | N | Styrene | 0.500 | 0.800 S U | 0.800 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03 (TB)/ QG29026-005 | Dibromofluoromethane | 79.63 | 80 - 119 | 10 - 119 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03 | TB | 1,1,1-Trichloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1,2,2-Tetrachloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1,2-Trichloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1-Dichloroethene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2,4-Trichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dibromo-3-chloropropane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dibromoethane (EDB) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dichloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dichloropropane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,3-Dichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,4-Dichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 2-Butanone (MEK) | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 2-Hexanone | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 4-Methyl-2-pentanone (MIBK) | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Acetone | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Benzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Bromodichloromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Bromoform | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Bromomethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Carbon disulfide | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Carbon tetrachloride | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Chlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Chloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Chloromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | cis-1,2-Dichloroethene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | cis-1,3-Dichloropropene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Cyclohexane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03 | TB | Dibromochloromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Dichlorodifluoromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Ethylbenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Isopropylbenzene (Cumene) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methyl acetate | 1.00 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methyl tert-butyl ether (MTBE) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methylcyclohexane | 5.00 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methylene chloride | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Styrene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Tetrachloroethene (PCE) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Toluene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | trans-1,2-Dichloroethene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | trans-1,3-Dichloropropene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Trichloroethene (TCE) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Trichlorofluoromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Vinyl chloride | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Xylenes, Total | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS07-00-002 (N)/ QG29026-003 | Toluene-d8 | 130.6 | 85 - 116 | 10 - 116 | percent | J/None | I | |
| CDL-DPS11-00-019 (N)/ QG29026-001 | Toluene-d8 | 116.0 | 85 - 116 | 10 - 116 | percent | J/None | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS11-00-019 | N | Acetone | 18.0 | 42.0 | 42.0 J | + | ug/kg | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Trip Blank**

The purpose of trip blanks is to determine the existence and magnitude of cross-contamination problems resulting from the shipping of samples. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in trip blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03 (TB)/ QG29026-005 | Chloroform | 0.2100 | < 0.2 | < 0.5 | ug/l | U/None | T | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ81322-002 (BS)/ QQ81322-002 | Caprolactam | 120.0 | 20 - 100 | 20 - 100 | percent | J/None | C | |
| QQ81322-002 (BS)/ QQ81322-002 | Acenaphthylene | 130.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ81322-002 (BS)/ QQ81322-002 | Hexachlorocyclopentadiene | 9.000 | 20 - 123 | 20 - 123 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW07-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 LS U | 3.20 UJ | - | ug/l | C/M |
| CDL-DPW11-00-2130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ81770-002 (BS)/ QQ81770-002 | Diethyl phthalate | 111.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | Anthracene | 111.0 | 55 - 105 | 55 - 105 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | Di-n-butyl phthalate | 114.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | n-Nitrosodiphenylamine | 120.0 | 50 - 115 | 50 - 115 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | Caprolactam | 123.0 | 45 - 122 | 45 - 122 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | Benzo(a)pyrene | 123.0 | 50 - 110 | 50 - 110 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | 4-Nitroaniline | 126.0 | 35 - 115 | 35 - 115 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | Benzyl butyl phthalate | 129.0 | 50 - 125 | 50 - 125 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | 2,4-Dimethylphenol | 132.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |
| QQ81770-002 (BS)/ QQ81770-002 | Acenaphthylene | 135.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW07-1130 (SD)/ QG29026-004MD | Caprolactam | 124.7 | 20 - 100 | 10 - 100 | percent | J/None | M | |
| CDL-DPW07-1130 (SD)/ QG29026-004MD | Acenaphthylene | 124.7 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-DPW07-1130 (SD)/ QG29026-004MD | 2,4-Dimethylphenol | 127.3 | 30 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-DPW07-1130 (SD)/ QG29026-004MD | Hexachlorocyclopentadiene | 19.48 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-DPW07-1130 (SD)/ QG29026-004MD | 3,3'-Dichlorobenzidine | 9.221 | 20 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-DPW07-1130 (MS)/ QG29026-004MS | Caprolactam | 112.2 | 20 - 100 | 10 - 100 | percent | J/None | M | |
| CDL-DPW07-1130 (MS)/ QG29026-004MS | 2,4-Dimethylphenol | 123.0 | 30 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-DPW07-1130 (MS)/ QG29026-004MS | Acenaphthylene | 124.3 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-DPW07-1130 (MS)/ QG29026-004MS | Hexachlorocyclopentadiene | 17.57 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-DPW07-1130 (MS)/ QG29026-004MS | 3,3'-Dichlorobenzidine | 11.35 | 20 - 110 | 10 - 110 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW07-1130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 R | - | ug/l | M |
| CDL-DPW07-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 LS U | 3.20 UJ | - | ug/l | C/M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS11-00-019 | N | Antimony | 1.10 | 0.830 S U | 0.830 UJ | - | mg/kg | M |
| CDL-DPS11-00-019 | N | Arsenic | 0.800 | 2.60 | 2.60 J | - | mg/kg | M |
| CDL-DPS11-00-019 | N | Selenium | 1.10 | 0.880 U | 0.880 UJ | - | mg/kg | M |

| Test Method: SW8260B | Extraction Method: SW5030B | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW07-1130 | N | Styrene | 0.500 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-TB1-03 | TB | 1,1,1-Trichloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1,2,2-Tetrachloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1,2-Trichloro-1,2,2-trifluoroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1,2-Trichloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,1-Dichloroethene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2,4-Trichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dibromo-3-chloropropane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dibromoethane (EDB) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dichloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,2-Dichloropropane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,3-Dichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 1,4-Dichlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 2-Butanone (MEK) | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 2-Hexanone | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | 4-Methyl-2-pentanone (MIBK) | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Acetone | 10.0 | 4.00 U | 4.00 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Benzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Bromodichloromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Bromoform | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Bromomethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Carbon disulfide | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Carbon tetrachloride | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Chlorobenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Chloroethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Chloromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | cis-1,2-Dichloroethene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | cis-1,3-Dichloropropene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Cyclohexane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Dibromochloromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Dichlorodifluoromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Ethylbenzene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Isopropylbenzene (Cumene) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5030B | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TB1-03 | TB | Methyl acetate | 1.00 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methyl tert-butyl ether (MTBE) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methylcyclohexane | 5.00 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Methylene chloride | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Styrene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Tetrachloroethene (PCE) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Toluene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | trans-1,2-Dichloroethene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | trans-1,3-Dichloropropene | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Trichloroethene (TCE) | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Trichlorofluoromethane | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Vinyl chloride | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |
| CDL-TB1-03 | TB | Xylenes, Total | 0.500 | 0.800 U | 0.800 UJ | - | ug/l | I |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS11-00-019 | N | Acetone | 18.0 | 42.0 | 42.0 J | + | ug/kg | I |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW07-1130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 R | - | ug/l | M |
| CDL-DPW07-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 LS U | 3.20 UJ | - | ug/l | C/M |
| CDL-DPW11-00-2130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| T | Trip Blank |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | CCB showed low level contamination but associated samples were either non-detect or had results above the Action Level. No flags were required |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | VSTD050YZ Dichlorodifluoromethane was out of limits with a high bias and associated samples were non-detect; therefore, no qualification is required. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. Some ICV recoveries were out of limits; however, all had a high bias and associated samples were non-detect for the targets therefore no qualification is required. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | Some CCV recoveries were out of limits; however, all had a high bias and associated samples were non-detect for the targets therefore no qualification is required. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Tier 3**
**Initial Calibration**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Standard ID:
Analyte:

Reported Y-Intercept:
Reported Slope: 0
Reported Correlation Coefficient (r):

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | | 0 |
| Level 2 = | | 15 |
| Level 3 = | | 1000 |
| Level 4 = | | 10000 |
| Level 5 = | | |
| Level 6 = | | |
| Level 7 = | | |

Y-Intercept = #DIV/0!
Slope = #DIV/0!
r2 = #DIV/0!
r = #DIV/0!

Comments: Single point calibration.

**Tier 3**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| CCV Standard ID: | CCV2 8/7/2015 16:39 | ICV Standard ID: | ICV 8/7/2015 14:53 |
| Analyte ID: | Manganese | Analyte ID: | Manganese |
| CCV % Rec.: | 97 | ICV % Rec.: | 99 |
| True CCV Conc. = | 2.5 | True CCV Conc. = | 1.25 |
| Found CCV Conc. = | 2.4361 | Found CCV Conc. = | 1.2383 |
| Calculated % Recovery = | 97.4 Match | Calculate( | 99.1 Match |

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| LCS ID: | QQ81625-002 | LCS/LCSD ID: | |
| Analyte ID: | Manganese | Analyte ID: | |
| Recovery: | 107 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

| | | | |
|---|---|---|---|
| Conc. LCS = | 110 | LCS Conc. = | |
| LCS Spike Conc. = | 100 | LCSD Conc. = | |
| % Recovery = | 110.0 | Match | RPD = #DIV/0! |

Comment: LCS only.

**Tier 3**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

ICSAB Standard ID: ICSAB MW-6232
Analyte ID: Manganese
ICSAB % Rec.: 100

True ICSAB Conc. = 0.5
ICSAB Conc. = 0.5

Calculated % Recovery = 100.0 Match

Comments:

**Tier 3**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: QG29026-001MS
Analyte ID: Manganese
Recovery: 116

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

Conc. MS Sample = 350.00
Unspiked Samp. = 220.00
MS Spike Conc. = 120.00

% Recovery = 108.3 Match

Sample ID: QG29026-001MS/QG29026-001MD
Analyte ID: Manganese
RPD: 12

$$\text{RPD} = \frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$$

MS Conc. = 350
MSD Conc. = 310

RPD = 12.1% Match

**Tier 3**
**Sample Result Verification**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

ug/L = $\frac{\text{Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor}}{\text{Initial Sample Amount (g or mL)}}$

Sample ID: **QG29026-001**

| Analyte | IDL (ug/L) | Corrected IDL (mg/kg) | Labortory Reported (mg/kg) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Amt. (g*) | % Moisture | Final Samp. Vol (mL) |
|---|---|---|---|---|---|---|---|---|---|
| Al | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Ba | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Ca | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Co | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Cr | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Fe | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| K | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Mg | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Mn | | 0 | **220** | **215.603** | 4.0465 | 1 | 1.095 | 14.3 | 50 |
| Na | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Ni | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| V | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Hg | | 0 | | **0** | | 1 | 20 | 20 | 20 |
| Ag | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| As | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Be | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Cd | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Cu | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Pb | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Sb | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Mn | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Ni | | 0 | | **0** | | 1 | 50 | 50 | 50 |
| Zn | | 0 | | **0** | | 1 | 50 | 50 | 50 |

Comments: Match

**Tier 3**
**Initial Calibration**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

**Method:** SW7470A

Cal ID: 15HG0943(8/4/15)
Analyte: Mercury

Correlation Coeff 0.999283
Slope: 1.1697E-04
Intercept: -2.1371E-01

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 0 | 171 |
| Level 2 = | 1 | 9660 |
| Level 3 = | 5 | 45111 |
| Level 4 = | 10 | 90236 |
| Level 5 = | 15 | 132729 |
| Level 6 = | 20 | 169053 |
| Level 7 = | | |
| Level 8 = | | |
| Level 9 = | | |

| | | |
|---|---|---|
| Corr Coef = | 0.999283 | Matches |
| Slope = | 1.1697E-04 | Matches |
| Y-Int= | -2.1371E-01 | Matches |

Comments:

**Tier 3**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

ICV Standard ID: ICV 15HG0929(7/29/15)
Analyte ID: Hg
ICV % Rec.: 103.1

True ICV Conc. = 10.0
Found ICV Conc. = 10.3125

Calculated % D = 103.1 Matches

Comment:

**Tier 3**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

CCV Standard ID: CCV 15HG0941(8/4/15)
Analyte ID: Hg
%D: 105.5

True CCV Conc. = 10.0
Found CCV Conc. = 10.5455

Calculated % D = 105.5 Match

Comment:

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A
**Matrix:** Water

---

| | | | |
|---|---|---|---|
| LCS ID: | QQ81287-002 | LCS/LCSD ID: | |
| Analyte ID: | Hg | Analyte ID: | Hg |
| Recovery: | 99 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD= $\frac{|\text{LCS Conc.} - \text{LCSD Conc.}|}{(\text{LCS Conc.} + \text{LCSD Conc.})/2} \times 100$

Conc. LCS = 0.82
LCS Spike Conc. = 0.83

LCS Conc. =
LCSD Conc. =

% Recovery = 98.8 Matches

RPD = #DIV/0! Match

Comments: LCS only.

**Tier 3**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

Sample ID: QG29026-003
Compound ID: Hg
Reported Result: 0.25 mg/kg

Conc. In Sample = $\frac{\text{(Inst Response*Slope+Y-int)*(Dilution Factor)*(Final Vol.)}}{\text{(Initial Amount)*(\% Solids*0.01)}}$

| | | Units | |
|---|---|---|---|
| Inst. Resp. = | 23389 | | |
| Slope = | 0.000117 | | |
| Y-Int = | -0.213710 | | |
| Initial Amount = | 0.681 | g | |
| Dilution Factor = | 1.0 | | |
| Final Amount = | 50 | mL | |
| % Solids = | 73.7 | % | |
| Conc. In Sample = | 251 | ug/kg | Match |

Comments:

Comments -

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 6/9/2015 22:03 |
| Recalculated Ion Ratio: | 174:95 |
| Reported Ratio: | 86.70% |

Relative Abundance (Ion Ratio) = $\frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$

Target Mass Response = 332864
Reference Mass Response = 383808

Relative Abundance = 86.73% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: VSTD050FC
Compound ID: Acetone
Reported Result: 0.1785

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 94229
I.S. Area = 131965
Compound Conc. = 200.0
I.S. Conc. = 50

RRF = 0.1785
Matches

Calibration ID: msd13 28-Jul-2015 14:32:30
Compound ID: Acetone
%RSD: 11.7%
Average RRF = 0.174597

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 0.2064
RF Level 2 = 0.1524
RF Level 3 = 0.1741
RF Level 4 = 0.1785
RF Level 5 = 0.1616
RF Level 6 =
RF Level 7 =
RF Level 8 =
RF Level 9 =
RF Level 10 =

Standard Deviation = 0.021
Average RRF = 0.1746 Matches
%RSD = 11.749 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| RRF Standard ID: | VSTD050YZ | %D Standard ID: | VSTD050YZ |
| Compound ID: | Acetone | Compound ID: | Acetone |
| Reported Result: | 0.181 | Reported %D: | 3.4% |

CCV RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%D = Average RRF - CCV RRF X 100 / Average RRF

| | | | |
|---|---|---|---|
| Compound Area = | 43122 | Average RRF = | 0.1746 |
| I.S. Area = | 119431 | CCV RRF = | 0.181 |
| Compound Conc. = | 100 | | |
| I.S. Conc. = | 50 | %D = | 3.4 Matches |

CCV RRF = 0.181 Matches %D Indicating Bias = -3.4

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: QG29026
Lab: Empirical Laboratories
Client: ECC

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: QG29026-004MS
Compound ID: Acetone
Recovery: 107

Sample ID: QG29026-004MS/QG29026-004MD
Compound ID: Acetone
RPD: 12

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS = 110.00
Unspiked Samp. = 6.3
MS Spike Conc. = 100.0

% Recovery = 103.7 Close Match

MS %. = 107
MSD % = 94

RPD = 13 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ81438-002 | Sample ID: | |
| Compound ID: | Acetone | Compound ID: | Methylcyclohexane |
| Recovery: | 94 | RPD: | |

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

| | | | | | |
|---|---|---|---|---|---|
| Conc. LCS = | 94 | | LCS Conc. = | | |
| LCS Spike Conc. = | 100 | | LCSD Conc. = | | |
| % Recovery = | 94 | Matches | RPD = | #DIV/0! | Matches |

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Sample ID: | QG29026-001 |
| Compound ID: | Acetone |
| Reported Result: | 42 |

Conc. In Sample = $\frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount} \times (\% \text{ Solids} * .01)} \times \text{Dilution Factor}$

| | | Units |
|---|---|---|
| Area Sample = | 17157 | Area |
| Area I.S. = | 108884 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.174597 | NA |
| Final Volume = | 5.00 | mL |
| Initial Amount = | 6.33 | g |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 85.7 | % |
| Conc. In Sample = | 41.59 | |
| | Matches | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 8/5/2015 10:26 |
| Recalculated Ion Ratio: | 51:198 |
| Reported Ratio: | 43.6% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 144768
Reference Mass Response = 331712

Relative Abundance = 43.6% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

RRF Standard ID: Ical, Level: 7
Compound ID: bis(2-Ethylhexyl) phthalate
Reported Result: 1.321529

Calibration ID: msd10 05-Aug-2015 11:11:30
Compound ID: bis(2-Ethylhexyl) phthalate
%RSD: 16.20%
Average RRF = 1.185606

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

Compound Area = 1370340
I.S. Area = 1659096
Compound Conc. = 25.0
I.S. Conc. = 40

RRF = 1.321529
Matches

| | | | |
|---|---|---|---|
| RF Level 1 = | | RF Level 6 = | 1.312799 |
| RF Level 2 = | 0.819 | RF Level 7 = | 1.321529 |
| RF Level 3 = | 0.963 | RF Level 8 = | 1.321599 |
| RF Level 4 = | 1.182 | RF Level 9 = | 1.309431 |
| RF Level 5 = | 1.256 | | |

Standard Deviation = 0.192
Average RRF = 1.1856064 Matches
%RSD = 16.18 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: svms-1298
Compound ID: bis(2-Ethylhexyl) phthalate
Reported Result: 1.422

%D Standard ID: svms-1298 12-Aug-2015 08:49:30
Compound ID: bis(2-Ethylhexyl) phthalate
Reported %D: 11.1%

CCV RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%D = (Standard Amt - Ccal Amt) X 100 / Standard Amt

Compound Area = 591060
I.S. Area = 1662723
Compound Conc. = 10
I.S. Conc. = 40

Standard Amt = 10.000
Ccal Amt = 11.114

%D = 11.1 Matches

CCV RRF = 1.422 Matches

%D Indicating Bias = -11.1

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: QG29026-004MS
Compound ID: bis(2-Ethylhexyl) phthalate
Recovery: 79

Sample ID: QG29026-004MS/QG29026-004MD
Compound ID: bis(2-Ethylhexyl) phthalate
RPD: 2

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS = 59.00
Unspiked Samp. =
MS Spike Conc. = 74.0

% Recovery = 80 Matches

MS Conc. = 59.00
MSD Conc. = 57.00

RPD = 3.4 Matches

Comments:

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QG29026
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ81322-002 | Sample ID: | |
| Compound ID: | bis(2-Ethylhexyl) phthalate | Compound ID: | |
| Recovery: | 90% | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}}$ X 100

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2}$ X 100

Conc. LCS = 18.00
LCS Spike Conc. = 20.00

LCS Conc. =
LCSD Conc. =

% Recovery = 90 Matches

RPD = #DIV/0! Matches

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QG29026 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: QG29026-004
Compound ID: benzo(a)anthracene
Reported Result: 0.19 ug/L

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor
TFA-MW291

| | | Units |
|---|---|---|
| Area Sample = | 10674 | Area |
| Area I.S. = | 2066755 | Area |
| Conc. I.S. = | 40 | |
| Average RRF = | 1.106179 | NA |
| Final Volume = | 1000.0 | uL |
| Initial Amount = | 1000.0000 | g |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 100 | |
| Conc. In Sample = | 0.19 | Matches |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q3 |
| SDG: | QG25002 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 21, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A - Dissolved | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|
| CDL-RB2-02 | QG25002-005 | Water | Equipment Blank/EB | | X | X | | X | X |
| CDL-DPS05-01-026 | QG25002-009 | Solid | Field Duplicate/FD | X | | | X | X | X |
| CDL-DPS09-01-035 | QG25002-007 | Solid | Field Duplicate/FD | X | | | X | X | X |
| CDL-DPS04-00-15 | QG25002-004 | Solid | Field Sample/N | X | | | X | X | X |
| CDL-DPS05-00-026 | QG25002-008 | Solid | Field Sample/N | X | | | X | X | X |
| CDL-DPS09-00-035 | QG25002-006 | Solid | Field Sample/N | X | | | X | X | X |
| CDL-DPW05-00-2736 | QG25002-010 | Water | Field Sample/N | | X | X | | X | X |
| CDL-DPW08-00-1130 | QG25002-001 | Water | Field Sample/N | | X | X | | X | X |
| CDL-TB1-03 | QG25002-002 | Water | Trip Blank/TB | | | | | X | |
| CDL-TB3-03 | QG25002-011 | Water | Trip Blank/TB | | | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) QG25002. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- Field Duplicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 45 results (3.89%) out of the 1158 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | No additional comments; see Checklist for detail. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW8270D | The laboratory noted that ICV/LCS recoveries were outside control limits. |

November 09, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 22, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80806-001 (LB)/ QQ80806-001 | Aluminum | 23.00 | < 6.7 | < 50 | mg/kg | U/None | L | |
| QQ80806-001 (LB)/ QQ80806-001 | Copper | 0.3700 | < 0.19 | < 0.5 | mg/kg | U/None | L | |
| QQ80806-001 (LB)/ QQ80806-001 | Potassium | 22.00 | < 19 | < 250 | mg/kg | U/None | L | |
| QQ80806-001 (LB)/ QQ80806-001 | Calcium | 34.00 | < 24 | < 250 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS04-00-15 | N | Potassium | 1300 | 650 BJ | 1300 U | + | mg/kg | L |
| CDL-DPS05-00-026 | N | Calcium | 270 | 56.0 BJ | 270 U | + | mg/kg | L |
| CDL-DPS05-00-026 | N | Copper | 0.540 | 1.80 B | 1.80 J | + | mg/kg | L |
| CDL-DPS05-00-026 | N | Potassium | 270 | 130 BJ | 270 U | + | mg/kg | L |
| CDL-DPS05-01-026 | FD | Calcium | 270 | 53.0 BJ | 270 U | + | mg/kg | L |
| CDL-DPS05-01-026 | FD | Copper | 0.550 | 1.60 B | 1.60 J | + | mg/kg | L |
| CDL-DPS05-01-026 | FD | Potassium | 270 | 120 BJ | 270 U | + | mg/kg | L |
| CDL-DPS09-00-035 | N | Calcium | 240 | 160 BJ | 240 U | + | mg/kg | L |
| CDL-DPS09-00-035 | N | Potassium | 240 | 230 BJ | 240 U | + | mg/kg | L |
| CDL-DPS09-01-035 | FD | Calcium | 240 | 150 BJ | 240 U | + | mg/kg | L |
| CDL-DPS09-01-035 | FD | Potassium | 240 | 210 BJ | 240 U | + | mg/kg | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ81169-001 (LB)/ QQ81169-001 | Cobalt | 0.001800 | < 0.0013 | < 0.025 | mg/l | U/None | L | |
| QQ81169-001 (LB)/ QQ81169-001 | Zinc | 0.004900 | < 0.0022 | < 0.02 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW7470A, Dissolved, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB2-02 (EB)/ QG25002-005 | Mercury | 0.00003200 | < 2.8e-005 | < 0.0002 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Equipment Blank for SW7470A, Dissolved**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW05-00-2736 | N | Mercury | 0.000200 | 0.0000360 J | 0.000200 U | + | mg/l | V |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Trip Blank**

The purpose of trip blanks is to determine the existence and magnitude of cross-contamination problems resulting from the shipping of samples. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in trip blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03 (TB)/ QG25002-002 | Acetone | 2.400 | < 1.6 | < 20 | ug/l | U/None | T | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Initial Calibration RSD/r^2/r**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| msd10 68/5/15 | bis(2-Ethylhexyl) phthalate | 16.20 | < 15 | < 15 | % | J/UJ | G2 | |
| msd10 68/5/15 | 3,3'-Dichlorobenzidine | 16.90 | < 15 | < 15 | % | J/UJ | G2 | |
| msd10 68/5/15 | 4,6-Dinitro-2-methylphenol | 17.60 | < 15 | < 15 | % | J/UJ | G2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration RSD/r^2/r for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW05-00-2736 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 UJ | | ug/l | G2 |
| CDL-DPW05-00-2736 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW05-00-2736 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW08-00-1130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 UJ | | ug/l | G2 |
| CDL-DPW08-00-1130 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW08-00-1130 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-RB2-02 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 UJ | | ug/l | G2 |
| CDL-RB2-02 | EB | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-RB2-02 | EB | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Initial Calibration RSD/r^2/r**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| msd10 68/5/15 | bis(2-Ethylhexyl) phthalate | 16.20 | < 15 | < 15 | % | J/UJ | G2 | |
| msd10 68/5/15 | 3,3'-Dichlorobenzidine | 16.90 | < 15 | < 15 | % | J/UJ | G2 | |
| msd10 68/5/15 | 4,6-Dinitro-2-methylphenol | 17.60 | < 15 | < 15 | % | J/UJ | G2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration RSD/r^2/r for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPS04-00-15 | N | 3,3'-Dichlorobenzidine | 960 | 190 U | 190 UJ | | ug/kg | G2 |
| CDL-DPS04-00-15 | N | 4,6-Dinitro-2-methylphenol | 960 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-DPS04-00-15 | N | bis(2-Ethylhexyl) phthalate | 380 | 190 J | 190 J | | ug/kg | TR/G2 |
| CDL-DPS05-00-026 | N | 3,3'-Dichlorobenzidine | 880 | 180 U | 180 UJ | | ug/kg | G2 |
| CDL-DPS05-00-026 | N | 4,6-Dinitro-2-methylphenol | 880 | 720 U | 720 UJ | | ug/kg | G2 |
| CDL-DPS05-00-026 | N | bis(2-Ethylhexyl) phthalate | 350 | 140 U | 140 UJ | | ug/kg | G2 |
| CDL-DPS05-01-026 | FD | 3,3'-Dichlorobenzidine | 890 | 180 U | 180 UJ | | ug/kg | G2 |
| CDL-DPS05-01-026 | FD | 4,6-Dinitro-2-methylphenol | 890 | 720 U | 720 UJ | | ug/kg | G2 |
| CDL-DPS05-01-026 | FD | bis(2-Ethylhexyl) phthalate | 350 | 140 U | 140 UJ | | ug/kg | G2 |
| CDL-DPS09-00-035 | N | 3,3'-Dichlorobenzidine | 860 | 170 U | 170 UJ | | ug/kg | G2 |
| CDL-DPS09-00-035 | N | 4,6-Dinitro-2-methylphenol | 860 | 700 U | 700 UJ | | ug/kg | G2 |
| CDL-DPS09-00-035 | N | bis(2-Ethylhexyl) phthalate | 340 | 110 J | 110 J | | ug/kg | TR/G2 |
| CDL-DPS09-01-035 | FD | 3,3'-Dichlorobenzidine | 860 | 170 U | 170 UJ | | ug/kg | G2 |
| CDL-DPS09-01-035 | FD | 4,6-Dinitro-2-methylphenol | 860 | 700 U | 700 UJ | | ug/kg | G2 |
| CDL-DPS09-01-035 | FD | bis(2-Ethylhexyl) phthalate | 340 | 110 J | 110 J | | ug/kg | TR/G2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| ICV (IV) | n-Nitrosodiphenylamine | 121.0 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |
| ICV (IV) | 4-Nitroaniline | 124.0 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |
| ICV (IV) | Acenaphthylene | 132.0 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |
| ICV (IV) | 2,4-Dimethylphenol | 139.0 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80709-002 (BS)/ QQ80709-002 | Acetophenone | 105.0 | 39 - 100 | 39 - 100 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Carbazole | 120.0 | 50 - 115 | 50 - 115 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Chrysene | 120.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | 4-Nitroaniline | 125.0 | 35 - 120 | 35 - 120 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Benzo(a)pyrene | 125.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Benzyl butyl phthalate | 130.0 | 45 - 115 | 45 - 115 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | n-Nitrosodiphenylamine | 130.0 | 50 - 110 | 50 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Indeno(1,2,3-c,d)pyrene | 140.0 | 45 - 125 | 45 - 125 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Acenaphthylene | 150.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Dibenz (a,h)anthracene | 310.0 | 40 - 125 | 40 - 125 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Hexachlorocyclopentadiene | 9.500 | 20 - 123 | 20 - 123 | percent | J/UJ | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Anthracene | 115.0 | 55 - 110 | 55 - 110 | percent | J/None | C | |
| QQ80709-002 (BS)/ QQ80709-002 | Caprolactam | 140.0 | 20 - 100 | 20 - 100 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW05-00-2736 | N | Anthracene | 0.200 | 0.0730 J | 0.0730 J | + | ug/l | C/TR |
| CDL-DPW05-00-2736 | N | Caprolactam | 5.00 | 1.30 JL | 1.30 J | + | ug/l | C/TR |
| CDL-DPW05-00-2736 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW08-00-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-RB2-02 | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 LS U | 3.20 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| QQ80689-002 (BS)/ QQ80689-002 | Diethyl phthalate | 105.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Anthracene | 105.0 | 55 - 105 | 55 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Benzo(a)pyrene | 117.0 | 50 - 110 | 50 - 110 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | n-Nitrosodiphenylamine | 117.0 | 50 - 115 | 50 - 115 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | 4-Nitroaniline | 126.0 | 35 - 115 | 35 - 115 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Caprolactam | 129.0 | 45 - 122 | 45 - 122 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | Acenaphthylene | 132.0 | 50 - 105 | 50 - 105 | percent | J/None | C | |
| QQ80689-002 (BS)/ QQ80689-002 | 2,4-Dimethylphenol | 138.0 | 30 - 105 | 30 - 105 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB2-02 (SD)/ QG25002-005MD | Hexachlorocyclopentadiene | 11.25 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-RB2-02 (SD)/ QG25002-005MD | Caprolactam | 122.5 | 20 - 100 | 10 - 100 | percent | J/None | M | |
| CDL-RB2-02 (SD)/ QG25002-005MD | Acenaphthylene | 130.0 | 50 - 105 | 10 - 105 | percent | J/None | M | |
| CDL-RB2-02 (MS)/ QG25002-005MS | Hexachlorocyclopentadiene | 11.00 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-RB2-02 (MS)/ QG25002-005MS | Benzo(a)pyrene | 115.0 | 55 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-RB2-02 (MS)/ QG25002-005MS | n-Nitrosodiphenylamine | 117.5 | 50 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-RB2-02 (MS)/ QG25002-005MS | Benzyl butyl phthalate | 122.5 | 45 - 115 | 10 - 115 | percent | J/None | M | |
| CDL-RB2-02 (MS)/ QG25002-005MS | Caprolactam | 130.0 | 20 - 100 | 10 - 100 | percent | J/None | M | |
| CDL-RB2-02 (MS)/ QG25002-005MS | Acenaphthylene | 132.5 | 50 - 105 | 10 - 105 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS04-00-15 | N | Potassium | 1300 | 650 BJ | 1300 U | + | mg/kg | L |
| CDL-DPS05-00-026 | N | Calcium | 270 | 56.0 BJ | 270 U | + | mg/kg | L |
| CDL-DPS05-00-026 | N | Copper | 0.540 | 1.80 B | 1.80 J | + | mg/kg | L |
| CDL-DPS05-00-026 | N | Potassium | 270 | 130 BJ | 270 U | + | mg/kg | L |
| CDL-DPS05-01-026 | FD | Calcium | 270 | 53.0 BJ | 270 U | + | mg/kg | L |
| CDL-DPS05-01-026 | FD | Copper | 0.550 | 1.60 B | 1.60 J | + | mg/kg | L |
| CDL-DPS05-01-026 | FD | Potassium | 270 | 120 BJ | 270 U | + | mg/kg | L |
| CDL-DPS09-00-035 | N | Calcium | 240 | 160 BJ | 240 U | + | mg/kg | L |
| CDL-DPS09-00-035 | N | Potassium | 240 | 230 BJ | 240 U | + | mg/kg | L |
| CDL-DPS09-01-035 | FD | Calcium | 240 | 150 BJ | 240 U | + | mg/kg | L |
| CDL-DPS09-01-035 | FD | Potassium | 240 | 210 BJ | 240 U | + | mg/kg | L |

| Test Method: SW7470A | Extraction Method: Dissolved | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW05-00-2736 | N | Mercury | 0.000200 | 0.0000360 J | 0.000200 U | + | mg/l | V |

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPS04-00-15 | N | 3,3'-Dichlorobenzidine | 960 | 190 U | 190 UJ | | ug/kg | G2 |
| CDL-DPS04-00-15 | N | 4,6-Dinitro-2-methylphenol | 960 | 780 U | 780 UJ | | ug/kg | G2 |
| CDL-DPS04-00-15 | N | bis(2-Ethylhexyl) phthalate | 380 | 190 J | 190 J | | ug/kg | TR/G2 |
| CDL-DPS05-00-026 | N | 3,3'-Dichlorobenzidine | 880 | 180 U | 180 UJ | | ug/kg | G2 |
| CDL-DPS05-00-026 | N | 4,6-Dinitro-2-methylphenol | 880 | 720 U | 720 UJ | | ug/kg | G2 |
| CDL-DPS05-00-026 | N | bis(2-Ethylhexyl) phthalate | 350 | 140 U | 140 UJ | | ug/kg | G2 |
| CDL-DPS05-01-026 | FD | 3,3'-Dichlorobenzidine | 890 | 180 U | 180 UJ | | ug/kg | G2 |
| CDL-DPS05-01-026 | FD | 4,6-Dinitro-2-methylphenol | 890 | 720 U | 720 UJ | | ug/kg | G2 |
| CDL-DPS05-01-026 | FD | bis(2-Ethylhexyl) phthalate | 350 | 140 U | 140 UJ | | ug/kg | G2 |
| CDL-DPS09-00-035 | N | 3,3'-Dichlorobenzidine | 860 | 170 U | 170 UJ | | ug/kg | G2 |
| CDL-DPS09-00-035 | N | 4,6-Dinitro-2-methylphenol | 860 | 700 U | 700 UJ | | ug/kg | G2 |
| CDL-DPS09-00-035 | N | bis(2-Ethylhexyl) phthalate | 340 | 110 J | 110 J | | ug/kg | TR/G2 |
| CDL-DPS09-01-035 | FD | 3,3'-Dichlorobenzidine | 860 | 170 U | 170 UJ | | ug/kg | G2 |
| CDL-DPS09-01-035 | FD | 4,6-Dinitro-2-methylphenol | 860 | 700 U | 700 UJ | | ug/kg | G2 |
| CDL-DPS09-01-035 | FD | bis(2-Ethylhexyl) phthalate | 340 | 110 J | 110 J | | ug/kg | TR/G2 |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW05-00-2736 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 UJ | | ug/l | G2 |
| CDL-DPW05-00-2736 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW05-00-2736 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW05-00-2736 | N | Anthracene | 0.200 | 0.0730 J | 0.0730 J | + | ug/l | C/TR |
| CDL-DPW05-00-2736 | N | Caprolactam | 5.00 | 1.30 JL | 1.30 J | + | ug/l | C/TR |
| CDL-DPW05-00-2736 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-DPW08-00-1130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 UJ | | ug/l | G2 |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW08-00-1130 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW08-00-1130 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-DPW08-00-1130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 L U | 3.20 UJ | - | ug/l | C |
| CDL-RB2-02 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 UJ | | ug/l | G2 |
| CDL-RB2-02 | EB | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-RB2-02 | EB | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 UJ | | ug/l | G2 |
| CDL-RB2-02 | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 LS U | 3.20 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-DPW05-00-2736 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 U | 2.00 UJ | G2 |
| CDL-DPW05-00-2736 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 U | 4.00 UJ | G2 |
| CDL-DPW05-00-2736 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 U | 4.00 UJ | G2 |
| CDL-DPW08-00-1130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 U | 2.00 UJ | G2 |
| CDL-DPW08-00-1130 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 U | 4.00 UJ | G2 |
| CDL-DPW08-00-1130 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 U | 4.00 UJ | G2 |
| CDL-RB2-02 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 U | 2.00 U | 2.00 UJ | G2 |
| CDL-RB2-02 | EB | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 U | 4.00 U | 4.00 UJ | G2 |
| CDL-RB2-02 | EB | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 U | 4.00 U | 4.00 UJ | G2 |

**Modified Qualifiers for test method SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-DPS04-00-15 | N | 3,3'-Dichlorobenzidine | 960 | 190 U | 190 U | 190 UJ | G2 |
| CDL-DPS04-00-15 | N | 4,6-Dinitro-2-methylphenol | 960 | 780 U | 780 U | 780 UJ | G2 |
| CDL-DPS04-00-15 | N | bis(2-Ethylhexyl) phthalate | 380 | 190 J | 190 J | 190 J | TR/G2 |
| CDL-DPS05-00-026 | N | 3,3'-Dichlorobenzidine | 880 | 180 U | 180 U | 180 UJ | G2 |
| CDL-DPS05-00-026 | N | 4,6-Dinitro-2-methylphenol | 880 | 720 U | 720 U | 720 UJ | G2 |
| CDL-DPS05-00-026 | N | bis(2-Ethylhexyl) phthalate | 350 | 140 U | 140 U | 140 UJ | G2 |
| CDL-DPS05-01-026 | FD | 3,3'-Dichlorobenzidine | 890 | 180 U | 180 U | 180 UJ | G2 |
| CDL-DPS05-01-026 | FD | 4,6-Dinitro-2-methylphenol | 890 | 720 U | 720 U | 720 UJ | G2 |
| CDL-DPS05-01-026 | FD | bis(2-Ethylhexyl) phthalate | 350 | 140 U | 140 U | 140 UJ | G2 |
| CDL-DPS09-00-035 | N | 3,3'-Dichlorobenzidine | 860 | 170 U | 170 U | 170 UJ | G2 |
| CDL-DPS09-00-035 | N | 4,6-Dinitro-2-methylphenol | 860 | 700 U | 700 U | 700 UJ | G2 |
| CDL-DPS09-00-035 | N | bis(2-Ethylhexyl) phthalate | 340 | 110 J | 110 J | 110 J | TR/G2 |
| CDL-DPS09-01-035 | FD | 3,3'-Dichlorobenzidine | 860 | 170 U | 170 U | 170 UJ | G2 |
| CDL-DPS09-01-035 | FD | 4,6-Dinitro-2-methylphenol | 860 | 700 U | 700 U | 700 UJ | G2 |
| CDL-DPS09-01-035 | FD | bis(2-Ethylhexyl) phthalate | 340 | 110 J | 110 J | 110 J | TR/G2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| G2 | Initial Calibration RSD/r^2/r |
| L | Lab Blank |
| M | MS Recovery |
| T | Trip Blank |
| TR | Trace Level Detect |
| V | Equipment Blank |
| V1 | ICV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. Some ICV recoveries were outside control limits with high bias; however, all associated samples were non-detect and no action is required. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |

**Tier 3**
**Initial Calibration**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Standard ID:
Analyte:

Reported Y-Intercept:
Reported Slope: 0
Reported Correlation Coefficient (r):

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | | 0 |
| Level 2 = | | 15 |
| Level 3 = | | 1000 |
| Level 4 = | | 10000 |
| Level 5 = | | |
| Level 6 = | | |
| Level 7 = | | |

Y-Intercept = #DIV/0!
Slope = #DIV/0!
r2 = #DIV/0!
r = #DIV/0!

Comments: Single point calibration.

**Tier 3**
**Continuing Calibration**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

CCV Standard ID: CCV2 7/29/2015 00:24
Analyte ID: Manganese
CCV % Rec.: 102

True CCV Conc. = 2.5
Found CCV Conc. = 2.5546

Calculated % Recovery = 102.2 Match

ICV Standard ID: ICV 7/28/2015 22:37
Analyte ID: Manganese
ICV % Rec.: 107

True CCV Conc. = 1.25
Found CCV Conc. = 1.3347

Calculate 106.8 Match

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| LCS ID: | QQ80806-002 | LCS/LCSD ID: | |
| Analyte ID: | Manganese | Analyte ID: | |
| Recovery: | 113 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

| | | | |
|---|---|---|---|
| Conc. LCS = | 114 | LCS Conc. = | |
| LCS Spike Conc. = | 100 | LCSD Conc. = | |
| % Recovery = | 114.0 | Match | RPD = #DIV/0! |

Comment: LCS only.

**Tier 3**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

ICSAB Standard ID: ICSAB MW-6232
Analyte ID: Manganese
ICSAB % Rec.: 98

True ICSAB Conc. = 0.5
ICSAB Conc. = 0.49

Calculated % Recovery = 98.0 Match

Comments:

**Tier 3**
**Sample Result Verification**

SDG #: QF10017
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

ug/L = Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor / Initial Sample Amount (g or mL)

Sample ID: **QG25002-008**

| Analyte | IDL (ug/L) | Corrected IDL (mg/kg) | Labortory Reported (mg/kg) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Amt. (g*) | % Moisture | Final Samp. Vol (mL) |
|---|---|---|---|---|---|---|---|---|---|
| Al | | 0 | **3700** | **3699** | 68.968 | 1 | 1.01 | 7.7 | 50 |
| Ba | | 0 | **9.5** | **9.46** | 0.17634 | 1 | 1.01 | 7.7 | 50 |
| Ca | | 0 | **56** | **56** | 1.0409 | 1 | 1.01 | 7.7 | 50 |
| Co | | 0 | **0.76** | **0.765** | 0.01426 | 1 | 1.01 | 7.7 | 50 |
| Cr | | 0 | **4** | **4.02** | 0.07498 | 1 | 1.01 | 7.7 | 50 |
| Fe | | 0 | **1800** | **1779** | 33.173 | 1 | 1.01 | 7.7 | 50 |
| K | | 0 | **130** | **127** | 2.3622 | 1 | 1.01 | 7.7 | 50 |
| Mg | | 0 | **130** | **133** | 2.481 | 1 | 1.01 | 7.7 | 50 |
| Mn | | 0 | **29** | **29** | 0.53566 | 1 | 1.01 | 7.7 | 50 |
| Na | | 0 | **0** | **0** | | 1 | 1.01 | 7.7 | 50 |
| Ni | | 0 | **1.4** | **1.40** | 0.02609 | 1 | 1.01 | 7.7 | 50 |
| V | | 0 | **4.2** | **4.19** | 0.07815 | 1 | 1.01 | 7.7 | 50 |
| Hg | | 0 | | **0** | | 1 | 1.01 | 7.7 | 20 |
| Ag | | 0 | **0** | **0** | | 1 | 1.01 | 7.7 | 50 |
| As | | 0 | **0.75** | **0.751** | 0.01401 | 1 | 1.01 | 7.7 | 50 |
| Be | | 0 | **0.035** | **0.0354** | 0.00066 | 1 | 1.01 | 7.7 | 50 |
| Cd | | 0 | **0** | **0** | | 1 | 1.01 | 7.7 | 50 |
| Cu | | 0 | **1.8** | **1.76** | 0.03275 | 1 | 1.01 | 7.7 | 50 |
| Pb | | 0 | **3.1** | **3.09** | 0.05758 | 1 | 1.01 | 7.7 | 50 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Comments: Match

**Tier 3**
**Initial Calibration**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

**Method:** SW7470A

Cal ID: STD 1.0 15HG0927(7/29/15)
Analyte: Mercury

Correlation C(: 0.999076
Slope: 1.1065E-04
Intercept: -1.4858E-01

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 0 | 107 |
| Level 2 = | 1 | 10057 |
| Level 3 = | 5 | 45617 |
| Level 4 = | 10 | 97887 |
| Level 5 = | 15 | 134535 |
| Level 6 = | 20 | 180763 |
| Level 7 = | | |
| Level 8 = | | |
| Level 9 = | | |

| | | |
|---|---|---|
| Corr Coef = | 0.999076 | Matches |
| Slope = | 1.1065E-04 | Matches |
| Y-Int= | -1.4858E-01 | Matches |

Comments:

**Tier 3**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

ICV Standard ID: ICV 15HG0929(7/29/15) - 1
Analyte ID: Hg
ICV % Rec.: 101.2

True ICV Conc. = 10.0
Found ICV Conc. = 10.1201

Calculated % D = 101.2 Matches

Comment:

**Tier 3**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

CCV Standard ID: CCV 15HG0925(7/29/15) - 1
Analyte ID: Hg
%D: 100.5

True CCV Conc. = 10.0
Found CCV Conc. = 10.0504

Calculated % D = 100.5 Match

Comment:

Comments:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A
**Matrix:** Water

---

| | | | |
|---|---|---|---|
| LCS ID: | QQ80801-002 | LCS/LCSD ID: | |
| Analyte ID: | Hg | Analyte ID: | Hg |
| Recovery: | 106 | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$

RPD= $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$

Conc. LCS = 0.88
LCS Spike Conc. = 0.83

LCS Conc. =
LCSD Conc. =

% Recovery = 106.0 Matches

RPD = #DIV/0! Match

Comments: LCS only.

**Tier 3**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

**Method:** SW7470A

Sample ID: QF10017-008
Compound ID: Hg
Reported Result: 0.0780 J mg/kg

Conc. In Sample = $\frac{\text{(Inst Response*Slope+Y-int)*(Dilution Factor)*(Final Vol.)}}{\text{(Initial Amount)*(\% Solids*0.01)}}$

| | | Units | |
|---|---|---|---|
| Inst. Resp. = | 8957.0000 | | |
| Slope = | 0.000111 | | |
| Y-Int = | -0.148580 | | |
| Initial Amount = | 0.637 | g | |
| Dilution Factor = | 1.0 | | |
| Final Amount = | 50 | mL | |
| % Solids = | 85 | % | |
| Conc. In Sample = | 77.80 | ug/kg | Match |

Comments:

Comments -

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 7/28/2015 14:24 |
| Recalculated Ion Ratio: | 174:95 |
| Reported Ratio: | 78.20% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 103848
Reference Mass Response = 132800

Relative Abundance = 78.20% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: VSTD050WS
Compound ID: Toluene
Reported Result: 0.7902

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

Compound Area = 150798
I.S. Area = 190841
Compound Conc. = 50.0
I.S. Conc. = 50

RRF = 0.7902
Matches

Calibration ID: msd15 28-Jul-2015 14:48:30
Compound ID: Toluene
%RSD: 10.7%
Average RRF = 0.729604

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

RF Level 1 = 0.7085
RF Level 2 = 0.6044
RF Level 3 = 0.7902
RF Level 4 = 0.7537
RF Level 5 = 0.7912
RF Level 6 =
RF Level 7 =
RF Level 8 =
RF Level 9 =
RF Level 10 =

Standard Deviation = 0.078
Average RRF = 0.7296 Matches
%RSD = 10.653 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | | | |
|---|---|---|---|
| RRF Standard ID: | VSTD050WZ | %D Standard ID: | VSTD050WZ |
| Compound ID: | Toluene | Compound ID: | Toluene |
| Reported Result: | 0.785 | Reported %D: | 7.6% |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} X\ 100$$

| | | | |
|---|---|---|---|
| Compound Area = | 149003 | Average RRF = | 0.7296 |
| I.S. Area = | 189718 | CCV RRF = | 0.785 |
| Compound Conc. = | 50 | | |
| I.S. Conc. = | 50 | %D = | 7.6 Matches |

CCV RRF = 0.785 Matches %D Indicating Bias = -7.6

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: QQ80980-002
Compound ID: Toluene
Recovery: 101

Sample ID:
Compound ID: Methylcyclohexane
RPD:

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 51
LCS Spike Conc. = 50

LCS Conc. =
LCSD Conc. =

% Recovery = 102 Matches

RPD = #DIV/0! Matches

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Sample ID: | QG25002-008 |
| Compound ID: | Toluene |
| Reported Result: | 1.90 J |

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount} \times (\%\ \text{Solids} * .01)} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 4448 | Area |
| Area I.S. = | 180570 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.729604 | NA |
| Final Volume = | 5.00 | mL |
| Initial Amount = | 4.71 | g |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 92.3 | % |
| Conc. In Sample = | 1.94 | |
| | Matches | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

| | |
|---|---|
| Tune ID: | 8/5/2015 10:26 |
| Recalculated Ion Ratio: | 51:198 |
| Reported Ratio: | 43.6% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 144768
Reference Mass Response = 331712

Relative Abundance = 43.6% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: Ical, Level: 7
Compound ID: bis(2-Ethylhexyl) phthalate
Reported Result: 1.321529

Calibration ID: msd10 05-Aug-2015 11:11:30
Compound ID: bis(2-Ethylhexyl) phthalate
%RSD: 16.20%
Average RRF = 1.185606

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%RSD = Standard Deviation / Average RRF X 100

Compound Area = 1370340
I.S. Area = 1659096
Compound Conc. = 25.0
I.S. Conc. = 40

RRF = 1.321529
Matches

RF Level 1 =
RF Level 2 = 0.819
RF Level 3 = 0.963
RF Level 4 = 1.182
RF Level 5 = 1.256
RF Level 6 = 1.312799
RF Level 7 = 1.321529
RF Level 8 = 1.321599
RF Level 9 = 1.309431

Standard Deviation = 0.192
Average RRF = 1.1856064 Matches
%RSD = 16.18 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: svms-1298
Compound ID: bis(2-Ethylhexyl) phthalate
Reported Result: 1.398

%D Standard ID: svms-1298
Compound ID: bis(2-Ethylhexyl) phthalate
Reported %D: 9.3%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{(Standard Amt - Ccal Amt)}}{\text{Standard Amt}} \times 100$$

Compound Area = 643465
I.S. Area = 1841145
Compound Conc. = 10
I.S. Conc. = 40

Standard Amt = 10.000
Ccal Amt = 10.935000

%D = 9.4 Matches

CCV RRF = 1.398 Matches

%D Indicating Bias = -9.4

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: QG25002
Lab: Shealy
Client: CDM Smith

Date: 11/5/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | QQ80689-002 | Sample ID: | |
| Compound ID: | bis(2-Ethylhexyl) phthalate | Compound ID: | |
| Recovery: | 108% | RPD: | |

% Recovery = $\frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}}$ X 100

RPD = $\frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2}$ X 100

Conc. LCS = 3600.00
LCS Spike Conc. = 3300.00

% Recovery = 109 Matches

LCS Conc. =
LCSD Conc. =

RPD = #DIV/0!
Matches

Comments: LCS only.

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | QG25002 | Date: | 11/5/17 |
| Lab: | Shealy | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: QG25002-010
Compound ID: Acenaphthene
Reported Result: 0.18 ug/kg

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor
TFA-MW291

| | | Units |
|---|---|---|
| Area Sample = | 9326 | Area |
| Area I.S. = | 1517577 | Area |
| Conc. I.S. = | 40 | |
| Average RRF = | 1.339689 | NA |
| Final Volume = | 1000.0 | uL |
| Initial Amount = | 1000.0000 | g |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 100 | |
| Conc. In Sample = | 0.18 | Matches |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q3 |
| SDG: | 8017_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 30, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-DPW04-00-1928 | 8017001 | Water | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 8017_HDOX . Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 2 results (5.88%) out of the 34 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | No additional comments; see Checklist for detail. |

November 30, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 30, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12014019 (BS)/ 12014019 | Octachlorodibenzo -p-dioxin | 100.5 | 101 - 151 | 10 - 151 | percent | J/UJ | C | |
| 12014019 (BS)/ 12014019 | 2,3,7,8-Tetrachlorodibenz ofuran | 94.50 | 95 - 126 | 10 - 126 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW04-00-1928 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.94 U | 6.94 UJ | - | pg/l | C |
| CDL-DPW04-00-1928 | N | Octachlorodibenzo-p-dioxin | 104 | 140 | 140 J | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

**Test Method: E1613 Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW04-00-1928 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.94 U | 6.94 UJ | - | pg/l | C |
| CDL-DPW04-00-1928 | N | Octachlorodibenzo-p-dioxin | 104 | 140 | 140 J | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

| Reason Code Definitions | |
|---|---|
| Code | Definition |
| C | LCS Recovery |

| Flag Code and Definitions | |
|---|---|
| Flag | Definition |
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 8017
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/28/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b03aug15a
Compound ID: 123478-HxCDD
Reported Result: 1.1200

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 4160
I.S. Area = 297000
Compound Conc. = 1.25
I.S. Conc. = 100

RRF = 1.1205
Matches

Calibration ID: b03aug15a
Compound ID: 123478-HxCDD
%RSD: 2.24085%
Average RRF = 1.07568

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 1.120
RF Level 2 = 1.074
RF Level 3 = 1.055
RF Level 4 = 1.054
RF Level 5 = 1.072
RF Level 6 = 1.080
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.024
Average RRF = 1.076 Matches
%RSD = 2.24 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: 8017
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/28/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b11aug15a-1
Compound ID: 2378-TCDD
Reported Result: 1.188

Standard ID: b11aug15a-1
Compound ID: 2378-TCDD
Reported %D: -7.6%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{(\text{CCV RRF} - \text{IC RRF})}{\text{IC RRF}} \times 100$$

Compound Area = 61100
I.S. Area = 514000
Compound Conc. = 10
I.S. Conc. = 100

IC RRF = 1.285
CCV RRF = 1.188

%D = -7.55 Matches

CCV RRF = 1.189 Matches

%D Indicating Bias = 7.55

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: 8017
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/28/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 8017001
Compound ID: 13C-2,3,7,8-TCDD
Reported Result: 90.5%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 1890.00
Surr. Spike Conc. = 2080.00

% Recovery = 90.9 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 8017
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/28/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 12014019
Compound ID: 2378-TCDD
Recovery: 91.9%

Sample ID: 12014019/12014020
Compound ID: 2378-TCDD
RPD: 4.7

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 184
LCS Spike Conc. = 200

LCS Conc. = 184
LCSD Conc. = 193

% Recovery = 92.0 Matches

RPD = 4.77 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

SDG #: 8017
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/28/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 8017001
Compound ID: OCDD
Reported Result: 140 pg/L

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor / Area IS X RF X Initial Volume

| | | Units |
|---|---|---|
| Area Sample = | 23300 | Area |
| Area I.S. = | 664500 | Area |
| Conc. I.S. = | 100 | |
| Average RRF = | 1.0434 | |
| Final Volume = | 0.040 | mL |
| Initial Amount = | 0.9593 | L |
| Dilution Factor = | 1.0 | NA |

Conc. In Sample = 0.140
Matches

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2015-Q3 |
| SDG: | 8000_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RB2-02 | 8000003 | Water | Equipment Blank/EB | X |
| CDL-DPW08-00-1130 | 8000001 | Water | Field Sample/N | X |
| CDL-DPW08-01-1130 | 8000002 | Water | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 8000_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 2 results (3.92%) out of the 51 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | No additional comments; see Checklist for detail. |

November 16, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12014019 (BS)/ 12014019 | 2,3,7,8-Tetrachlorodibenzofuran | 94.50 | 95 - 126 | 10 - 126 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW08-00-1130 | N | 2,3,7,8-Tetrachlorodibenzofuran | 11.0 | 7.33 U | 7.33 UJ | - | pg/l | C |
| CDL-DPW08-01-1130 | N | 2,3,7,8-Tetrachlorodibenzofuran | 11.0 | 7.34 U | 7.34 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: E1613 Extraction Method: SW3520C | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW08-00-1130 | N | 2,3,7,8-Tetrachlorodibenzofuran | 11.0 | 7.33 U | 7.33 UJ | - | pg/l | C |
| CDL-DPW08-01-1130 | N | 2,3,7,8-Tetrachlorodibenzofuran | 11.0 | 7.34 U | 7.34 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 8000
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: A10JUL15A-4
Compound ID: 2378-TCDD
Reported Result: 1.1540

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 7190
I.S. Area = 2490000
Compound Conc. = 0.3
I.S. Conc. = 100

RRF = 1.1550
Matches

Calibration ID: A10JUL15A-4
Compound ID: 2378-TCDD
%RSD: 6.52124%
Average RRF = 1.11668

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 1.154
RF Level 2 = 1.057
RF Level 3 = 1.014
RF Level 4 = 1.111
RF Level 5 = 1.149
RF Level 6 = 1.216
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.073
Average RRF = 1.117 Matches
%RSD = 6.511 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: 8000
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b11aug15a-1
Compound ID: 2378-TCDD
Reported Result: 1.188

Standard ID: b11aug15a-1
Compound ID: 2378-TCDD
Reported %D: -7.6%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 61100
I.S. Area = 514000
Compound Conc. = 10
I.S. Conc. = 100

IC RRF = 1.285
CCV RRF = 1.188

%D = 7.55 Matches

CCV RRF = 1.189 Matches

%D Indicating Bias = -7.5

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: 8000
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 8000001
Compound ID: 13C-2,3,7,8-TCDD
Reported Result: 90.6%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 1990
Surr. Spike Conc. = 2200

% Recovery = 90.5 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 8000
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 12014019
Compound ID: 2378-TCDD
Recovery: 91.9%

Sample ID: 12014019/12014020
Compound ID: 2378-TCDD
RPD: 4.70%

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 184
LCS Spike Conc. = 200

LCS Conc. = 184
LCSD Conc. = 193

% Recovery = 92.0 Matches

RPD = 4.77 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 8000 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: 8000001
Compound ID: OCDD
Reported Result: 206 pg/L

Conc. In Sample = $\frac{\text{Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor}}{\text{Area IS X RF X Initial Volume}}$

| | | Units |
|---|---|---|
| Area Sample = | 36400 | Area |
| Area I.S. = | 744000 | Area |
| Conc. I.S. = | 100 | |
| Average RRF = | 1.0434 | |
| Final Volume = | 0.040 | mL |
| Initial Amount = | 0.9091 | L |
| Dilution Factor = | 1.0 | NA |

Conc. In Sample = 0.206
Matches

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q2 |
| SDG: | RE09002 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | James Parker, Senior Scientist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | November 08, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A | SW7470A - Dissolved | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|---|
| CDL-RB1-03-051016 | RE09002-005 | Water | Equipment Blank/EB | X | | X | | | X | X |
| CDL-DPW12-00-2332 | RE09002-001 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-DPW17-00-1928 | RE09002-006 | Water | Field Sample/N | | X | | X | | X | X |
| CDL-TP25C-00-034 | RE09002-010 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-TP26B-00-010 | RE09002-009 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-TP27A-00-004 | RE09002-003 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-TP27A-01-004 | RE09002-004 | Solid | Field Sample/N | X | | | | X | X | X |
| CDL-TB2-03-050616 | RE09002-002 | Water | Trip Blank/TB | | | | | | X | |
| CDL-TB3-03-051016 | RE09002-007 | Water | Trip Blank/TB | | | | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RE09002. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

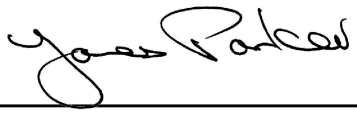
Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 75 results (7.32%) out of the 1025 results (sample and field QC samples) reported are qualified based on review and 1 results (0.10%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Sample CDL-RB2-03-051116 was cancelled per client request.

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | It was noted on the EDD that there were Matrix Spike mismatches where the parent sample differed from the MS/SD analyses in regard to dilution |
| SW7470A | This checklist also covers samples analyzed by SW7471B |
| SW8260B | No additional comments; see Checklist for detail. |
| SW8270D | No additional comments; see Checklist for detail. |



October 30, 2017

Reviewed by James Parker, Senior Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 09, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 (SD)/ RE09002-003MD | Manganese | 38.53 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP27A-00-004 (SD)/ RE09002-003MD | Iron | 19.88 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-TP27A-00-004 (SD)/ RE09002-003MD | Antimony | 42.99 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP27A-00-004 (SD)/ RE09002-003MD | Copper | 300.0 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Aluminum | 132.2 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Calcium | 144.7 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Manganese | 50.46 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Barium | 132.8 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Iron | 23.60 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Antimony | 56.43 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | Copper | 134.5 | 75 - 125 | 30 - 125 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 | N | Antimony | 11.0 | 6.80 JS | 6.80 J | - | mg/kg | M/TR |
| CDL-TP27A-00-004 | N | Manganese | 0.850 | 980 S | 980 J | | mg/kg | M/A |
| CDL-TP27A-00-004 | N | Barium | 1.50 | 710 S | 710 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Calcium | 280 | 5300 S | 5300 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Copper | 5.70 | 180 S | 180 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Antimony | 0.950 | 2.80 | 2.80 J | - | mg/kg | M |
| CDL-TP27A-01-004 | N | Manganese | 0.710 | 330 | 330 J | - | mg/kg | M |
| CDL-TP27A-01-004 | N | Barium | 1.20 | 280 | 280 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Calcium | 240 | 1700 | 1700 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Copper | 0.470 | 56.0 | 56.0 J | + | mg/kg | M/D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RE09002-003MD (SD)/ RE09002-003MD | Calcium | 52.87 | < 30 | < 30 | rpd | J/UJ | D | |
| RE09002-003MD (SD)/ RE09002-003MD | Zinc | 31.78 | < 30 | < 30 | rpd | J/UJ | D | |
| RE09002-003MD (SD)/ RE09002-003MD | Barium | 34.48 | < 30 | < 30 | rpd | J/UJ | D | |
| RE09002-003MD (SD)/ RE09002-003MD | Copper | 76.19 | < 30 | < 30 | rpd | J/UJ | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 | N | Barium | 1.50 | 710 S | 710 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Calcium | 280 | 5300 S | 5300 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Copper | 5.70 | 180 S | 180 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Zinc | 2.80 | 430 S | 430 J | | mg/kg | D/A |
| CDL-TP27A-01-004 | N | Barium | 1.20 | 280 | 280 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Calcium | 240 | 1700 | 1700 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Copper | 0.470 | 56.0 | 56.0 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Zinc | 2.40 | 160 | 160 J | | mg/kg | D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Serial dilution**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RE09002-003SD | Zinc | 12.30 | < 10 | < 10 | percent | J/UJ | A | |
| RE09002-003SD | Manganese | 14.20 | < 10 | < 10 | percent | J/UJ | A | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Serial dilution for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 | N | Manganese | 0.850 | 980 S | 980 J | | mg/kg | M/A |
| CDL-TP27A-00-004 | N | Zinc | 2.80 | 430 S | 430 J | | mg/kg | D/A |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-03-051016 (EB)/ RE09002-005 | Barium | 0.002300 | < 0.0019 | < 0.025 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, Continuing Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| VSTD050RZ 5/13 19:56 (CV) | Tetrachloroethene (PCE) | 71.90 | 80 - 120 | 40 - 160 | percent | J/UJ | V2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Continuing Calibration Verification for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP26B-00-010 | N | Tetrachloroethene (PCE) | 6.60 | 5.30 U | 5.30 Uj | - | ug/kg | V2 |
| CDL-TP27A-00-004 | N | Tetrachloroethene (PCE) | 5.40 | 4.30 U | 4.30 Uj | - | ug/kg | V2 |
| CDL-TP27A-01-004 | N | Tetrachloroethene (PCE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/V2 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-03-051016 (EB)/ RE09002-005 | Methylene chloride | 0.4500 | < 0.42 | < 1 | ug/l | U/None | V | |
| CDL-RB1-03-051016 (EB)/ RE09002-005 | Acetone | 4.900 | < 1.6 | < 20 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, Internal standard**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP26B-00-010 | 1,2-Dibromo-3-chloropropane | 76710 | | | area counts | J/UJ | S | |
| CDL-TP27A-01-004 | 1,2-Dibromo-3-chloropropane | 76720 | | | area counts | J/UJ | S | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Internal standard for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP26B-00-010 | N | 1,2-Dibromo-3-chloropropane | 6.60 | 5.30 U | 5.30 UJ | | ug/kg | S |
| CDL-TP27A-01-004 | N | 1,2-Dibromo-3-chloropropane | 4.30 | 3.40 Q U | 3.40 UJ | | ug/kg | I/S |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-01-004 (N)/ RE09002-004 | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 77.72 | 79 - 119 | 10 - 119 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-01-004 | N | 1,1,1-Trichloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1,2,2-Tetrachloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1,2-Trichloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1-Dichloroethene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2,4-Trichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/S/V2 |
| CDL-TP27A-01-004 | N | 1,2-Dibromo-3-chloropropane | 4.30 | 3.40 Q U | 3.40 UJ | | ug/kg | I/S |
| CDL-TP27A-01-004 | N | 1,2-Dibromoethane (EDB) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2-Dichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2-Dichloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2-Dichloropropane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/S |
| CDL-TP27A-01-004 | N | 1,3-Dichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/V2 |
| CDL-TP27A-01-004 | N | 1,4-Dichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/S/V2 |
| CDL-TP27A-01-004 | N | 2-Butanone (MEK) | 8.60 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 2-Hexanone | 8.60 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 4-Methyl-2-pentanone (MIBK) | 8.60 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Acetone | 17.0 | 6.80 Q U | 6.80 UJ | | ug/kg | I |
| CDL-TP27A-01-004 | N | Benzene | 4.30 | 1.40 JQ | 1.40 J | - | ug/kg | I/TR |
| CDL-TP27A-01-004 | N | Bromodichloromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Bromoform | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Bromomethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Carbon disulfide | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Carbon tetrachloride | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chloroform | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chloromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | cis-1,2-Dichloroethene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-01-004 | N | cis-1,3-Dichloropropene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Cyclohexane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Dibromochloromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Dichlorodifluoromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Ethylbenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Isopropylbenzene (Cumene) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methyl acetate | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methyl tert-butyl ether (MTBE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methylcyclohexane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methylene chloride | 4.30 | 3.40 Q U | 3.40 UJ | | ug/kg | I |
| CDL-TP27A-01-004 | N | Styrene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Tetrachloroethene (PCE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/V2 |
| CDL-TP27A-01-004 | N | Toluene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | trans-1,2-Dichloroethene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | trans-1,3-Dichloropropene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Trichloroethene (TCE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Trichlorofluoromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Vinyl chloride | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Xylenes, Total | 4.30 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Trip Blank**

The purpose of trip blanks is to determine the existence and magnitude of cross-contamination problems resulting from the shipping of samples. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in trip blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB2-03-050616 (TB)/ RE09002-002 | Methylene chloride | 0.5100 | < 0.42 | < 1 | ug/l | U/None | T | |
| CDL-TB2-03-050616 (TB)/ RE09002-002 | Acetone | 4.800 | < 1.6 | < 20 | ug/l | U/None | T | |
| CDL-TB3-03-051016 (TB)/ RE09002-007 | 1,2-Dichloroethane | 0.1500 | < 0.13 | < 0.5 | ug/l | U/None | T | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Continuing Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| SVMS 2072 5/19 08:54 (CV) | 4,6-Dinitro-2-methylphenol | 124.9 | 80 - 120 | 80 - 120 | percent | J/None | V2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Continuing Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| SVMS 2072 5/19 08:54 (CV) | 4,6-Dinitro-2-methylphenol | 124.9 | 80 - 120 | 80 - 120 | percent | J/None | V2 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-03-051016 (EB)/ RE09002-005 | 4-Chloro-3-methylphenol | 2.800 | < 0.26 | < 1 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| SVMS 2007 (IV) | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 78.00 | 80 - 120 | 80 - 120 | percent | J/UJ | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration Verification for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW12-00-2332 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 U | 0.400 UJ | - | ug/l | V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ12891-002 (BS)/ RQ12891-002 | 3,3'-Dichlorobenzidine | 14.00 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |
| RQ12891-002 (BS)/ RQ12891-002 | n-Nitrosodiphenylamine | 49.00 | 50 - 110 | 50 - 110 | percent | J/UJ | C | |
| RQ12891-002 (BS)/ RQ12891-002 | Benzo(a)pyrene | 53.00 | 55 - 110 | 55 - 110 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW12-00-2332 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-DPW12-00-2332 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-DPW12-00-2332 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 L U | 0.920 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW17-00-1928 (SD)/ RE09002-006MD | Pentachlorophenol | 115.9 | 40 - 115 | 10 - 115 | percent | J/None | M | |
| CDL-DPW17-00-1928 (MS)/ RE09002-006MS | Pentachlorophenol | 120.5 | 40 - 115 | 10 - 115 | percent | J/None | M | |
| CDL-DPW17-00-1928 (MS)/ RE09002-006MS | n-Nitrosodiphenylamine | 18.18 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DPW17-00-1928 (MS)/ RE09002-006MS | 3,3'-Dichlorobenzidine | 5.909 | 20 - 110 | 10 - 110 | percent | J/R | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW17-00-1928 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 R | - | ug/l | M |
| CDL-DPW17-00-1928 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 (MS)/ RE09002-003MS | 2-Methylphenol (o-Cresol) | 110.0 | 40 - 105 | 10 - 105 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RE09002-006MD (SD)/ RE09002-006MD | n-Nitrosodiphenylamine | 105.9 | < 30 | < 30 | rpd | J/None | D | |
| RE09002-006MD (SD)/ RE09002-006MD | 3,3'-Dichlorobenzidine | 154.0 | < 30 | < 30 | rpd | J/None | D | |
| RE09002-006MD (SD)/ RE09002-006MD | 4-Chloroaniline | 32.43 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW17-00-1928 (SD)/ RE09002-006MD | Terphenyl-d14 | 28.33 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW17-00-1928 (MS)/ RE09002-006MS | Terphenyl-d14 | 49.86 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP27A-00-004 | N | Manganese | 0.850 | 980 S | 980 J | | mg/kg | M/A |
| CDL-TP27A-00-004 | N | Zinc | 2.80 | 430 S | 430 J | | mg/kg | D/A |
| CDL-TP27A-00-004 | N | Antimony | 11.0 | 6.80 JS | 6.80 J | - | mg/kg | M/TR |
| CDL-TP27A-00-004 | N | Barium | 1.50 | 710 S | 710 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Calcium | 280 | 5300 S | 5300 J | + | mg/kg | M/D |
| CDL-TP27A-00-004 | N | Copper | 5.70 | 180 S | 180 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Antimony | 0.950 | 2.80 | 2.80 J | - | mg/kg | M |
| CDL-TP27A-01-004 | N | Manganese | 0.710 | 330 | 330 J | - | mg/kg | M |
| CDL-TP27A-01-004 | N | Zinc | 2.40 | 160 | 160 J | | mg/kg | D |
| CDL-TP27A-01-004 | N | Barium | 1.20 | 280 | 280 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Calcium | 240 | 1700 | 1700 J | + | mg/kg | M/D |
| CDL-TP27A-01-004 | N | Copper | 0.470 | 56.0 | 56.0 J | + | mg/kg | M/D |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP26B-00-010 | N | 1,2-Dibromo-3-chloropropane | 6.60 | 5.30 U | 5.30 UJ | | ug/kg | S |
| CDL-TP26B-00-010 | N | Tetrachloroethene (PCE) | 6.60 | 5.30 U | 5.30 Uj | - | ug/kg | V2 |
| CDL-TP27A-00-004 | N | Tetrachloroethene (PCE) | 5.40 | 4.30 U | 4.30 Uj | - | ug/kg | V2 |
| CDL-TP27A-01-004 | N | 1,2-Dibromo-3-chloropropane | 4.30 | 3.40 Q U | 3.40 UJ | | ug/kg | I/S |
| CDL-TP27A-01-004 | N | Tetrachloroethene (PCE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/V2 |
| CDL-TP27A-01-004 | N | 1,1,1-Trichloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1,2,2-Tetrachloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1,2-Trichloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,1-Dichloroethene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2,4-Trichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/S/V2 |
| CDL-TP27A-01-004 | N | 1,2-Dibromoethane (EDB) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2-Dichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2-Dichloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 1,2-Dichloropropane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/S |
| CDL-TP27A-01-004 | N | 1,3-Dichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/V2 |
| CDL-TP27A-01-004 | N | 1,4-Dichlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I/S/V2 |
| CDL-TP27A-01-004 | N | 2-Butanone (MEK) | 8.60 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 2-Hexanone | 8.60 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | 4-Methyl-2-pentanone (MIBK) | 8.60 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Acetone | 17.0 | 6.80 Q U | 6.80 UJ | | ug/kg | I |
| CDL-TP27A-01-004 | N | Benzene | 4.30 | 1.40 JQ | 1.40 J | - | ug/kg | I/TR |
| CDL-TP27A-01-004 | N | Bromodichloromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Bromoform | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Bromomethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-TP27A-01-004 | N | Carbon disulfide | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Carbon tetrachloride | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chlorobenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chloroethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chloroform | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Chloromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | cis-1,2-Dichloroethene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | cis-1,3-Dichloropropene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Cyclohexane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Dibromochloromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Dichlorodifluoromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Ethylbenzene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Isopropylbenzene (Cumene) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methyl acetate | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methyl tert-butyl ether (MTBE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methylcyclohexane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Methylene chloride | 4.30 | 3.40 Q U | 3.40 UJ | | ug/kg | I |
| CDL-TP27A-01-004 | N | Styrene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Toluene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | trans-1,2-Dichloroethene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | trans-1,3-Dichloropropene | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Trichloroethene (TCE) | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Trichlorofluoromethane | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Vinyl chloride | 4.30 | 3.40 Q U | 3.40 UJ | - | ug/kg | I |
| CDL-TP27A-01-004 | N | Xylenes, Total | 4.30 | 6.90 Q U | 6.90 UJ | - | ug/kg | I |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW12-00-2332 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 U | 0.400 UJ | - | ug/l | V1 |
| CDL-DPW12-00-2332 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-DPW12-00-2332 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-DPW12-00-2332 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 L U | 0.920 UJ | - | ug/l | C |
| CDL-DPW17-00-1928 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 R | - | ug/l | M |
| CDL-DPW17-00-1928 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| A | Serial dilution |
| C | LCS Recovery |
| D | MS RPD |
| H1 | Test Hold Time |
| I | Surrogate recovery outside project limits. |
| M | MS Recovery |
| S | Internal standard |
| T | Trip Blank |
| TR | Trace Level Detect |
| V | Equipment Blank |
| V1 | ICV |
| V2 | CCV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | Contamination was noted, but affected samples were either non-detects or had results that were significantly greater than what was noted in the CCB's. No action required. |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | • | | | Outliers with low bias were noted for Al, Ba, Mn and Zn. Sample CDL-TP27A-00-004 was affected. |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits for diluted and undiluted analyses which reported both non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted analyses that reported non-detects and and positive target analyte hits. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | Only CC's were evaluated |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | MS/MSD was not analyzed for this SDG |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted analyses that reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | The lab narrated ICV failed low for Bis(2-chloro-1-methyl)ether and affected samples RE-09002-003, 004, 005, 006, 009 and 010. In fact only RE09002-001 was associated with this outlier. |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | See QC outlier section Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted and diluted analyses that reported non-detects and positive target analyte hits. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Level IV**
**Initial Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**CALCULATIONS**

Standard ID: I4 Method 6010D_6010C_200.7(v34)
Analyte: Cr

Reported Y-Intercept: 0
Reported Slope: 0.035839
Reported Correlation Coefficient (r): 0.999881

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | 0.00007 | 0 |
| Level 2 = | 0.00045 | 0.01 |
| Level 3 = | 0.01816 | 0.5 |
| Level 4 = | 0.09158 | 2.5 |
| Level 5 = | 0.17719 | 5 |

| | | |
|---|---|---|
| Y-Intercept = | 0.00055269 | Matches |
| Slope = | 0.03554139 | Matches |
| r2 = | 0.9997312 | |
| r = | 0.9998656 | Matches |

Comments:

**Level IV**
**Continuing Calibration**

SDG #: RE09002
Lab: Shealy Environmental Services
Client: USACE

Date: 10/23/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**CALCULATIONS**

CCV Standard ID: CCV4 5/19/2016 15:40
Analyte ID: Se
CCV % Rec.: 103%

True CCV Conc. = 0.5
Found CCV Conc. = 0.51653

Calculated % Recovery = 103.3% Matches

ICV Standard ID: VHG
Analyte ID: Cu
CCV % Rec.: 99

True CCV Conc. = 2.5
Found CCV Conc. = 2.469

Calculated % Recovery = 98.8 Matches

Comments: Outliers were noted for Selenium, but affected samples were reanalyzed with acceptable Selenium CCV's.

**Level IV**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**CALCULATIONS**

LCS ID: RQ12837-002
Analyte ID: Ba
Recovery: 103%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 2.0606
LCS Spike Conc. = 2

% Recovery = 103.0% Matches

Comment:
LCS only

**Level IV**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

## CALCULATIONS

| | | | |
|---|---|---|---|
| ICSAB Standard ID: | ICSAB MW-6603 | ICSA Standard ID: | ICSA MW6607 |
| Analyte ID: | Fe | Analyte ID: | Mg |
| ICSAB % Rec.: | 95% | ICSAB % Rec.: | 1.04 |
| True ICSAB Conc. = | 200 | True ICSA Conc. = | 500 |
| ICSAB Conc. = | 190.06 | Found ICSA Conc. = | 517.9 |
| Calculated % Recovery = | 95.0 Matches | Calculated | 103.6 Matches |

Comments:

**Level IV**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**CALCULATIONS**

Sample ID: CDL-TP27A-00-004 MS
Analyte ID: Pb
Recovery: 145%

$$\%\ Rec = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

Conc. MS Sample = 670.00
Unspiked Samp. = 250.00
MS Spike Conc. = 290.00

% Recovery = 144.8% Matches

Sample ID: CDL-TP27A-00-004 MS/MSD
Analyte ID: Ba
RPD: 0.35

$$RPD = \frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$$

MS Conc. = 1700
MSD Conc. = 1200

RPD = 34.5% Matches

Comments:

**Level IV**
**ICP Serial Dilutions**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**CALCULATIONS**

Sample ID: CDL-TP27A-00-004L
Analyte ID: Mn
%D: 14%

Undiluted Sample Conc. = 983
Dilution Conc. = 1122.5

Calculated %D = -14.2% Matches

%D Indicating Bias = 0.1

Comments:

**Level IV**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**CALCULATIONS**

$$\text{ug/L} = \frac{\text{Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor}}{\text{Initial Sample Amount (g or mL)}}$$

Sample ID: **CDL-TP27A-00-004 (RE09002-003)**

| Analyte | IDL (ug/L) | Corrected IDL (ug/L) | Labortory Reported (ug/L) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Vol. (g) | Final Samp. Vol. (ml) | Solids % |
|---|---|---|---|---|---|---|---|---|---|
| Al | | 0 | **11000** | **10662.2** | 187.93 | 1 | 1.084 | 50 | 81.3 |
| Ba | | 0 | **710** | **711.637** | 12.5432 | 1 | 1.084 | 50 | 81.3 |
| Ca | | 0 | **5300** | **5321.51** | 93.796 | 1 | 1.084 | 50 | 81.3 |
| Co | | 0 | **15** | **14.7783** | 0.26048 | 1 | 1.084 | 50 | 81.3 |
| Cr | | 0 | **58** | **58.0908** | 0.10239 | 10 | 1.084 | 50 | 81.3 |
| Fe | | 0 | **160000** | **164565** | 290.06 | 10 | 1.084 | 50 | 81.3 |
| K | | 0 | **430** | **429.631** | 7.5726 | 1 | 1.084 | 50 | 81.3 |
| Mg | | 0 | **1200** | **1235.12** | 2.177 | 10 | 1.084 | 50 | 81.3 |
| Mn | | 0 | **980** | **983.159** | 17.329 | 1 | 1.084 | 50 | 81.3 |
| Na | | 0 | **130** | **127.977** | 2.2557 | 1 | 1.084 | 50 | 81.3 |
| Ni | | 0 | **35** | **35.465** | 0.06251 | 10 | 1.084 | 50 | 81.3 |
| V | | 0 | **15** | **15.1425** | 0.02669 | 10 | 1.084 | 50 | 81.3 |
| Se | | 0 | | **0** | | 10 | 1.084 | 50 | 81.3 |
| Ag | | 0 | **15** | **15.2736** | 0.26921 | 1 | 1.084 | 50 | 81.3 |
| As | | 0 | **8.4** | **8.40698** | 0.14818 | 1 | 1.084 | 50 | 81.3 |
| Be | | 0 | | **0** | | 1 | 1.084 | 50 | 81.3 |
| Cd | | 0 | **3.4** | **3.40409** | 0.006 | 10 | 1.084 | 50 | 81.3 |
| Cu | | 0 | **180** | **180.054** | 0.31736 | 10 | 1.084 | 50 | 81.3 |
| Pb | | 0 | **250** | **254.416** | 0.44843 | 10 | 1.084 | 50 | 81.3 |
| Sb | | 0 | **6.8** | **6.76847** | 0.01193 | 10 | 1.084 | 50 | 81.3 |
| Zn | | 0 | **430** | **429.869** | 7.5768 | 1 | 1.084 | 50 | 81.3 |

Comments -

**Level 4**
**Initial Calibration**

SDG #: RE09002
Lab: Shealy Environmental Services
Client: USACE

Date: 10/23/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW7470A

## CALCULATIONS

Cal ID: 05/20/16
Analyte: Hg

Correlation Coeff: 0.9999002
Slope: 0.0003009
y-Intercept: -0.02411

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b) Page 1505

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 43 | 0 |
| Level 2 = | 7845 | 1 |
| Level 3 = | 37878 | 5 |
| Level 4 = | 78058 | 10 |
| Level 5 = | 116487 | 15 |
| Level 6 = | 152842 | 20 |

| | | |
|---|---|---|
| Corr Coef = | 0.9999002 | Matches |
| Slope = | 0.00013009 | Matches |
| Y-Int= | -0.02411 | Matches |

Comments:

**Level 4**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

ICV Standard ID: ICV 16Hg0534
Analyte ID: Hg
ICV % Rec.: 102.0%

True ICV Conc. = 2.000
Found ICV Conc. = 2.0424

Calculated % D = 102.1%

Comment:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

CCV Standard ID: CCV 1 5/20/2016 15:44
Analyte ID: Hg
%D: 6.0%

Spiked Conc= 0.010
Reptd Conc= 0.010553

Calculated % D = -5.5% Matches

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

LCS ID: RQ13403-002
Analyte ID: Hg
Recovery: 106.0%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 0.02
LCS Spike Conc. = 0.020

% Recovery = 106.1% Matches

Comments:
LCS only

**Level 4**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Sample ID: CDL-TP27A-00-004 MS
Analyte ID: Hg
Recovery: 101

MS/MSD ID: CDL-TP27A-00-004 MS/MSD
Analyte ID: Hg
RPD: 8.7

$$\%\ Rec = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$RPD = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS Sample = 0.98
Unspiked Samp. = 0.047
MS Spike Conc. = 0.92

% Recovery = 101.4 Matches

MS % = 101
MSD % = 111

RPD = 9.43 Doesn't match

Comment:
Both percent recovery and concentration were used to check RPD value.
Recalculated RPD doesn't match what lab reported. However, both results are within project criteria

**Level 4**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/23/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Sample ID: CDL-TP26B-00-010
Compound ID: Hg
Reported Result: 0.14 mg/kg

Conc. In Sample = ((Slope) x (Analyte Response) + Y-Intercept) X DF

| | | Units |
|---|---|---|
| Inst. Resp. = | 11752 | |
| Slope = | 0.0001301 | |
| Y-Int = | -0.0241 | |
| Initial Amount (g) = | 0.6650 | g |
| Dilution Factor = | 1.0 | |
| Final Amount(ml)= | 50 | |
| % Solids = | 81.2 | |
| Conc. In Sample = | 0.14 | mg/kg |

Comments:

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

Tune ID: 7051316.b.BFBSC 5/13/2016 08:34
Recalculated Ion Ratio: 174:95
Reported Ratio: 64.2%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 222400
Reference Mass Response = 346624

Relative Abundance = 64.2% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: RE09002
Lab: Shealy Environmental Services
Client: USACE

Method: SW8260B

Date: 10/20/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**CALCULATIONS**

RRF Standard ID: Level 3
Compound ID: 1,1-DCA
Reported Result: 1.120305

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 31750
I.S. Area = 283405
Compound Conc. = 5.0
I.S. Conc. = 50

RRF = 1.120305
Matches

Calibration ID: S8260B-13.M MSD-13 4/27/2016
Compound ID: Bromoform
%RSD: 11.6%
Average RRF = 0.238453

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 0.192299
RF Level 2 = 0.238819
RF Level 3 = 0.244226
RF Level 4 = 0.251394
RF Level 5 = 0.265526

Standard Deviation = 0.028
Average RRF = 0.238453 Matches
%RSD = 11.607 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

RRF Standard ID: VSTD050SC5/13/2016 08:57
Compound ID: 1,1-DCE
Reported Result: 0.470436

%D Standard ID: VSTD050RZ 5/13/2016 08:50
Compound ID: Trichloroethene
Reported %D: -11.5%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 159076
I.S. Area = 338146
Compound Conc. = 50
I.S. Conc. = 50

Average RRF = 0.35123
CCV RRF = 0.31081

%D = 11.5 Matches

CCV RRF = 0.470436 Matches

%D Indicating Bias = -11.5

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

Sample ID: CDL-TP27A-01-004
Compound ID: BFB
Reported Result: 78%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 36.22
Surr. Spike Conc. = 46.50

% Recovery = 78 Matches

Comments: The lab did not specify the concentration of spiked surrogate, 46.5 ug/Kg was assumed based on reported % recovery

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

Sample ID: RQ13158-002
Compound ID: Carbon Tetrachloride
Recovery: 87%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 43.60
LCS Spike Conc. = 50.00

% Recovery = 87 Matches

Comments:
LCS only

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

Sample ID: CDL-RB1-03-051016
Compound ID: Acetone
Reported Result: 4.9

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 14330 | Area |
| Area I.S. = | 306364 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.479644 | NA |
| Final Volume = | 5.0 | mL |
| Initial Amount = | 5.00 | |
| Dilution Factor = | 1.0 | NA |
| Conc. In Sample = | 4.9 | |
| | Match | |

Comments: The lab report did not include an intial or final volume, so 5.0 ml was assumed

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8270D | | |

**CALCULATIONS**

Tune ID: 10051901 5/19/2016 08:35
Recalculated Ion Ratio: 275:198
Reported Ratio: 26.2%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 235584
Reference Mass Response = 898240

Relative Abundance = 26.2% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8270D | | |

**CALCULATIONS**

RRF Standard ID: Level 5
Compound ID: o-Cresol
Reported Result: 1.427617

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 775201
I.S. Area = 1086007
Compound Conc. = 10.0
I.S. Conc. = 20

RRF = 1.427617
Matches

Calibration ID: 8270D-11.M MSD-11
Compound ID: 4-Chloroaniline
%RSD: 9.7%
Average RRF = 0.396234

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 =
RF Level 2 = 0.325617
RF Level 3 = 0.355010
RF Level 4 = 0.392945
RF Level 5 = 0.417410
RF Level 6 = 0.398707
RF Level 7 = 0.419095
RF Level 8 = 0.418703
RF Level 9 = 0.442383

Standard Deviation = 0.038
Average RRF = 0.396234 Matches
%RSD = 9.7 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8270D | | |

**CALCULATIONS**

| | | | |
|---|---|---|---|
| RRF Standard ID: | SVMS 2072 5/19/16 08:54 | %D Standard ID: | SVMS 2073 5/11/16 08:47 |
| Compound ID: | 1,4-Dichlorobenzene | Compound ID: | Fluoranthene |
| Reported Result: | 1.740225 | Reported %D: | 6.1% |

CCV RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%D = (Average RRF - CCV RRF) / Average RRF X 100

| | | | |
|---|---|---|---|
| Compound Area = | 610872 | Average RRF = | 1.170739 |
| I.S. Area = | 1404122 | CCV RRF = | 1.241791 |
| Compound Conc. = | 5 | | |
| I.S. Conc. = | 20 | %D = | -6.1 Matches |
| CCV RRF = | 1.740225 Matches | %D Indicating Bias = | 6.1 |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8270D | | |

**CALCULATIONS**

Sample ID: CDL-DPW12-00-2332
Compound ID: 2-Fluorobiphenyl
Reported Result: 52.00%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 5.1649
Surr. Spike Conc. = 10.00

% Recovery = 52 Matches

Comments: Surrogate spike concentrations were not documented in the lab report, therefore 10 was assumed

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8270D | | |

### CALCULATIONS

| | | | |
|---|---|---|---|
| Sample ID: | CDL-DPW17-00-1928 MS | Sample ID: | CDL-TP27A-00-004 MS/MSD |
| Compound ID: | Pyrene | Compound ID: | 4,6-Dinitro-2-methylphenol |
| Recovery: | 95% | RPD: | 18% |

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

| | | | |
|---|---|---|---|
| Conc. MS = | 21.22 | MS % Rec = | 73.00 |
| Unspiked Samp. = | 0.0 | MSD % Rec = | 61.00 |
| MS Spike Conc. = | 22.0 | | |
| | | RPD = | 17.9 Matches |
| % Recovery = | 96.4% Close Match | | |

Comments:
Spike added concentration was not consistent between MS and MSD, so % recoveries were compared for %RPD

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: RE09002
Lab: Shealy Environmental Services
Client: USACE

Method: SW8270D

Date: 10/20/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**CALCULATIONS**

Sample ID: RQ12891-002
Compound ID: 3,3'-Dichlorobenzidine
Recovery: 14%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 1.40
LCS Spike Conc. = 10.00

% Recovery = 14.0% Matches

Comments: LCS only

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RE09002 | Date: | 10/20/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| Method: | SW8270D | | |

**CALCULATIONS**

Sample ID: CDL-TP26B-00-010
Compound ID: Pyrene
Reported Result: 45000.0

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \frac{\text{Dilution Factor}}{\text{\% Solids}}$$

| | | Units |
|---|---|---|
| Area Sample = | 7095379 | Area |
| Area I.S. = | 5128941 | Area |
| Conc. I.S. = | 20 | |
| Average RRF = | 1.253689 | NA |
| Final Volume = | 5.0 | mL |
| Initial Amount = | 30.2000 | g |
| Dilution Factor = | 10.0 | NA |
| % Solids= | 81.2 | |
| Conc. In Sample = | 44998.1965 | |
| | Match | |

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q2 |
| SDG: | RE06021 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | James Parker, Senior Scientist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | November 09, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C - Dissolved | SW7470A - Dissolved | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|
| CDL-DPW13-00-3544 | RE06021-003 | Water | Field Sample/N | X | X | X | X |
| CDL-DPW14-00-3140 | RE06021-005 | Water | Field Sample/N | X | X | X | X |
| CDL-DPW14-01-3140 | RE06021-006 | Water | Field Sample/N | X | X | X | X |
| CDL-DPW15-00-3140 | RE06021-004 | Water | Field Sample/N | X | X | X | X |
| CDL-DPW16-00-2130 | RE06021-001 | Water | Field Sample/N | X | X | X | X |
| CDL-DPW16-01-2130 | RE06021-002 | Water | Field Sample/N | X | X | X | X |
| CDL-TB1-03-050416 | RE06021-007 | Water | Trip Blank/TB | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RE06021. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

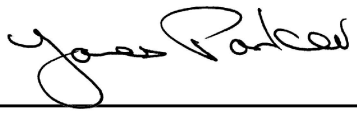
- Blank
- Blank - Negative
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 259 results (30.65%) out of the 845 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | No additional comments; see Checklist for detail. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW8260B | No additional comments; see Checklist for detail. |
| SW8270D | No additional comments; see Checklist for detail. |



October 31, 2017

Reviewed by James Parker, Senior Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 14, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW7470A, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ12756-001 (LB)/ RQ12756-001 | Mercury | 0.00007100 | < 2.8e-005 | < 0.0002 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, Trip Blank**

The purpose of trip blanks is to determine the existence and magnitude of cross-contamination problems resulting from the shipping of samples. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in trip blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03-050416 (TB)/ RE06021-007 | Toluene | 0.2700 | < 0.24 | < 1 | ug/l | U/None | T | |
| CDL-TB1-03-050416 (TB)/ RE06021-007 | Methylene chloride | 0.5000 | < 0.42 | < 1 | ug/l | U/None | T | |
| CDL-TB1-03-050416 (TB)/ RE06021-007 | Acetone | 6.000 | < 1.6 | < 20 | ug/l | U/None | T | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ12891-002 (BS)/ RQ12891-002 | 3,3'-Dichlorobenzidine | 14.00 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |
| RQ12891-002 (BS)/ RQ12891-002 | n-Nitrosodiphenylamine | 49.00 | 50 - 110 | 50 - 110 | percent | J/UJ | C | |
| RQ12891-002 (BS)/ RQ12891-002 | Benzo(a)pyrene | 53.00 | 55 - 110 | 55 - 110 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW13-00-3544 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW15-00-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-DPW15-00-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-DPW15-00-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 L U | 0.920 UJ | - | ug/l | C |
| CDL-DPW16-00-2130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-DPW16-00-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | C/M |
| CDL-DPW16-00-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 LS U | 0.920 UJ | - | ug/l | C/M |
| CDL-DPW16-01-2130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW16-01-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/M/I |
| CDL-DPW16-01-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/M/I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW16-00-2130 (SD)/ RE06021-001MD | n-Nitrosodiphenylamine | 43.64 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DPW16-00-2130 (SD)/ RE06021-001MD | Benzo(a)pyrene | 54.55 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DPW16-00-2130 (MS)/ RE06021-001MS | n-Nitrosodiphenylamine | 47.83 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW16-00-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | C/M |
| CDL-DPW16-00-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 LS U | 0.920 UJ | - | ug/l | C/M |
| CDL-DPW16-01-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/M/I |
| CDL-DPW16-01-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/M/I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW13-00-3544 (N)/ RE06021-003 | Terphenyl-d14 | 31.20 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW14-00-3140 (N)/ RE06021-005 | Terphenyl-d14 | 19.97 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW14-00-3140 (N)/ RE06021-005 | 2-Fluorobiphenyl | 43.84 | 44 - 119 | 10 - 119 | percent | J/UJ | I | |
| CDL-DPW14-00-3140 (N)/ RE06021-005 | Terphenyl-d14 | 14.47 | 50 - 134 | 10 - 134 | percent | J/UJ | I | Diluted Out |
| CDL-DPW14-00-3140 (N)/ RE06021-005 | 2-Fluorobiphenyl | 32.16 | 44 - 119 | 10 - 119 | percent | J/UJ | I | Diluted Out |
| CDL-DPW14-00-3140 (N)/ RE06021-005 | Nitrobenzene-d5 | 39.09 | 44 - 120 | 10 - 120 | percent | J/UJ | I | Diluted Out |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | Terphenyl-d14 | 18.40 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | 2-Fluorobiphenyl | 36.39 | 44 - 119 | 10 - 119 | percent | J/UJ | I | |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | Nitrobenzene-d5 | 40.54 | 44 - 120 | 10 - 120 | percent | J/UJ | I | |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | Terphenyl-d14 | 11.51 | 50 - 134 | 10 - 134 | percent | J/UJ | I | Diluted Out |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | 2-Fluorobiphenyl | 26.91 | 44 - 119 | 10 - 119 | percent | J/UJ | I | Diluted Out |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | Nitrobenzene-d5 | 33.12 | 44 - 120 | 10 - 120 | percent | J/UJ | I | Diluted Out |
| CDL-DPW14-01-3140 (N)/ RE06021-006 | 2,4,6-Tribromophenol | 39.49 | 43 - 140 | 10 - 140 | percent | J/UJ | I | Diluted Out |
| CDL-DPW16-00-2130 (SD)/ RE06021-001MD | Terphenyl-d14 | 33.48 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW16-00-2130 (MS)/ RE06021-001MS | Terphenyl-d14 | 38.98 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW16-01-2130 (N)/ RE06021-002 | Terphenyl-d14 | 14.88 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DPW16-01-2130 (N)/ RE06021-002 | 2-Fluorophenol | 16.66 | 19 - 119 | 10 - 119 | percent | J/UJ | I | |
| CDL-DPW16-01-2130 (N)/ RE06021-002 | 2,4,6-Tribromophenol | 22.73 | 43 - 140 | 10 - 140 | percent | J/UJ | I | |
| CDL-DPW16-01-2130 (N)/ RE06021-002 | 2-Fluorobiphenyl | 28.36 | 44 - 119 | 10 - 119 | percent | J/UJ | I | |
| CDL-DPW16-01-2130 (N)/ RE06021-002 | Nitrobenzene-d5 | 31.40 | 44 - 120 | 10 - 120 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW13-00-3544 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW13-00-3544 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW13-00-3544 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW14-00-3140 | N | Acenaphthene | 0.200 | 0.340 Q | 0.340 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Anthracene | 0.200 | 0.0730 JQ | 0.0730 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Biphenyl (Diphenyl) | 1.00 | 3.70 Q | 3.70 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Dibenzofuran | 1.00 | 0.670 JQ | 0.670 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Fluorene | 0.200 | 0.590 Q | 0.590 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | m,p-Cresol | 2.00 | 0.760 JQ | 0.760 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Phenanthrene | 0.200 | 0.510 Q | 0.510 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Pyrene | 0.200 | 0.140 JQ | 0.140 J | - | ug/l | I/TR |
| CDL-DPW14-01-3140 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW14-01-3140 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Acenaphthene | 0.200 | 0.290 Q | 0.290 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Biphenyl (Diphenyl) | 1.00 | 3.10 Q | 3.10 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Dibenzofuran | 1.00 | 0.620 JQ | 0.620 J | - | ug/l | I/TR |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW14-01-3140 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Fluorene | 0.200 | 0.550 Q | 0.550 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | m,p-Cresol | 2.00 | 0.770 JQ | 0.770 J | - | ug/l | I/TR |
| CDL-DPW14-01-3140 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Phenanthrene | 0.200 | 0.520 Q | 0.520 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Pyrene | 0.200 | 0.140 JQ | 0.140 J | - | ug/l | I/TR |
| CDL-DPW16-01-2130 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW16-01-2130 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW16-01-2130 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/M/I |
| CDL-DPW16-01-2130 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/M/I |
| CDL-DPW16-01-2130 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW16-01-2130 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW13-00-3544 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW13-00-3544 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW13-00-3544 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW13-00-3544 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW14-00-3140 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Acenaphthene | 0.200 | 0.340 Q | 0.340 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Anthracene | 0.200 | 0.0730 JQ | 0.0730 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW14-00-3140 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Biphenyl (Diphenyl) | 1.00 | 3.70 Q | 3.70 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Dibenzofuran | 1.00 | 0.670 JQ | 0.670 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Fluorene | 0.200 | 0.590 Q | 0.590 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | m,p-Cresol | 2.00 | 0.760 JQ | 0.760 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW14-00-3140 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Phenanthrene | 0.200 | 0.510 Q | 0.510 J | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-00-3140 | N | Pyrene | 0.200 | 0.140 JQ | 0.140 J | - | ug/l | I/TR |
| CDL-DPW14-00-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Acenaphthene | 0.200 | 0.290 Q | 0.290 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Biphenyl (Diphenyl) | 1.00 | 3.10 Q | 3.10 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DPW14-01-3140 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Dibenzofuran | 1.00 | 0.620 JQ | 0.620 J | - | ug/l | I/TR |
| CDL-DPW14-01-3140 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Fluorene | 0.200 | 0.550 Q | 0.550 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | m,p-Cresol | 2.00 | 0.770 JQ | 0.770 J | - | ug/l | I/TR |
| CDL-DPW14-01-3140 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/I |
| CDL-DPW14-01-3140 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Phenanthrene | 0.200 | 0.520 Q | 0.520 J | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW14-01-3140 | N | Pyrene | 0.200 | 0.140 JQ | 0.140 J | - | ug/l | I/TR |
| CDL-DPW15-00-3140 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-DPW15-00-3140 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-DPW15-00-3140 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 L U | 0.920 UJ | - | ug/l | C |
| CDL-DPW16-00-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 LS U | 0.920 UJ | - | ug/l | C/M |
| CDL-DPW16-00-2130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-DPW16-00-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | C/M |
| CDL-DPW16-01-2130 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW16-01-2130 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Chloroaniline | 1.00 | 0.400 QL U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 4-Nitrophenol | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/M/I |
| CDL-DPW16-01-2130 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Caprolactam | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DPW16-01-2130 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QL U | 0.920 UJ | - | ug/l | C/M/I |
| CDL-DPW16-01-2130 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DPW16-01-2130 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| T | Trip Blank |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | The lab narrated a CCB outlier, but did not identify the analyte. Raw data indicated that Be failed, but this was not a project target analyte. No action taken on this basis. |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | MS/MSD was not analyzed for this SDG |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted analyses that reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | CCB showed low level contamination but associated samples were either non-detect or had results above the Action Level. No flags were required |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | MS/MSD were not analyzed for this SDG |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised in association with undiluted analyses that reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with diluted and undiluted analyses that reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | The lab narrated ICV, LCS and surrogate outliers. |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | Not verified from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC outlier section; LCS only |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with diluted and undiluted analyses which reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Level 4**
**Initial Calibration**

SDG #: RE06021
Lab: Shealy Environmental Services
Client: USACE

Date: 10/19/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW6010C

**CALCULATIONS**

Standard ID: 5/16/2016 ICP 5
Analyte: Mn

Reported Y-Intercept: 0
Reported Slope: 1
Reported Correlation Coefficient (r): 0.999941

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | 0.0023 | 0 |
| Level 2 = | 2.2215 | 2.5 |
| Level 3 = | 4.3684 | 5 |
| Level 4 = | 0.01403 | 0.015 |
| Level 5 = | 0.45301 | 0.5 |

Y-Intercept = -0.0118267 matches
Slope = 1.14376808 matches
r2 = 0.9999291
r = 0.9999646 matches

Comments: The dates on the ICAL summaries do not match the raw data from which the data was derived

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

CCV Standard ID: CCV2 5/16/2016 14:53
Analyte ID: Mn
CCV % Rec.: 101%

True CCV Conc. = 2.5
Found CCV Conc. = 2.5312

Calculated % Recovery = 101.2% Matches

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

LCS ID: RQ12837-002
Analyte ID: Ba
Recovery: 103%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 2.0606
LCS Spike Conc. = 2

% Recovery = 103.0% Matches

Comment: LCS only

**Level 4**
**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW6010C

## CALCULATIONS

| | | | |
|---|---|---|---|
| ICSAB Standard ID: | ICSAB MW-6603 | ICSA Standard ID: | ICSA MM6607 |
| Analyte ID: | Fe | Analyte ID: | Ca |
| ICSAB % Rec.: | 95% | ICSAB % Rec.: | 94% |
| True ICSAB Conc. = | 200 | True ICSA Conc. = | 500 |
| ICSAB Conc. = | 190.06 | Found ICSA Conc. = | 469.38 |
| Calculated % Recovery = | 95.0 Matches | Calculated % Recovery = | 93.9 Matches |

Comments:

**Level 4**
**Sample Result Verification**

SDG #: RE06021 | Date: 10/19/17
Lab: Shealy Environmental Services | Page: 1 of 1
Client: USACE | Validated by: JP
Second Review by: LS

**Method:** SW6010C

**CALCULATIONS**

ug/L = Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor / Initial Sample Amount (g or mL)

Sample ID: **CDL-DPW14-00-2130 (RE06021-001)**

| Analyte | IDL (ug/L) | Corrected IDL (ug/L) | Labortory Reported (ug/L) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Vol. (mL) | Final Samp. Vol. (mL) |
|---|---|---|---|---|---|---|---|---|
| Al | | 0 | | **0** | | 1 | 50 | 50 |
| Ba | | 0 | **0.0076** | **0.0076** | 0.00762 | 1 | 50 | 50 |
| Ca | | 0 | **20** | **20** | 19.6 | 1 | 50 | 50 |
| Co | | 0 | | **0** | | 1 | 50 | 50 |
| Cr | | 0 | | **0** | | 1 | 50 | 50 |
| Fe | | 0 | | **0** | | 1 | 50 | 50 |
| K | | 0 | **1.7** | **1.7** | 1.7153 | 1 | 50 | 50 |
| Mg | | 0 | **5.9** | **5.9** | 5.912 | 1 | 50 | 50 |
| Mn | | 0 | **0.12** | **0.12** | 0.12057 | 1 | 50 | 50 |
| Na | | 0 | **5** | **5** | 4.9655 | 1 | 50 | 50 |
| Ni | | 0 | | **0** | | 1 | 50 | 50 |
| V | | 0 | | **0** | | 1 | 50 | 50 |
| Se | | 0 | | **0** | | 1 | 50 | 50 |
| Ag | | 0 | | **0** | | 1 | 50 | 50 |
| As | | 0 | | **0** | | 1 | 50 | 50 |
| Be | | 0 | | **0** | | 1 | 50 | 50 |
| Cd | | 0 | | **0** | | 1 | 50 | 50 |
| Cu | | 0 | | **0** | | 1 | 50 | 50 |
| Pb | | 0 | | **0** | | 1 | 50 | 50 |
| Sb | | 0 | | **0** | | 1 | 50 | 50 |
| Zn | | 0 | **0.051** | **0.051** | 0.05099 | 1 | 50 | 50 |

Comments -

**Level 4**
**Initial Calibration**

SDG #: RE06021
Lab: Shealy Environmental Services
Client: USACE

Date: 10/17/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW7470A

## CALCULATIONS

Cal ID: 05/12/16
Analyte: Hg

Correlation Coeff: 0.9999667
Slope: 0.0001622
y-Intercept: -0.00587

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 23 | 0 |
| Level 2 = | 686 | 0.1 |
| Level 3 = | 1205 | 0.2 |
| Level 4 = | 6169 | 1 |
| Level 5 = | 11907 | 2 |
| Level 6 = | 30155 | 5 |

| | | |
|---|---|---|
| Corr Coef = | 0.999967 | Matches |
| Slope = | 0.0001662 | Matches |
| Y-Int = | -0.00587 | Matches |

Comments:

**Level 4**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

## CALCULATIONS

ICV Standard ID: CkICV0502
Analyte ID: Hg
ICV % Rec.: 105.0%

True ICV Conc. = 2.000
Found ICV Conc. = 2.11

Calculated % D = 105.5%

Comment:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

CCV Standard ID: Ck4CCV0496 5/10/2016 16:26 page 1499
Analyte ID: Hg
%D: 7.5%

Spiked Conc= 2.000
Reptd Conc= 1.85

Calculated % D = 7.5% matches

Comment:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

LCS ID: RQ12756-002
Analyte ID: Hg
Recovery: 100.0%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 2.00
LCS Spike Conc. = 2.000

% Recovery = 100.0% Matches

Comments: LCS only

**Level 4**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Sample ID: **CDL-DPW13-00-3544 (RE06021-003)**

| Analyte | IDL (ug/L) | Corrected IDL (ug/L) | Labortory Reported (mg/L) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Vol. (mL) | Final Samp. Vol. (mL) |
|---|---|---|---|---|---|---|---|---|
| Hg | | 0 | **0.000078** | **0.000078** | 0.078 | 1 | 40 | 50 |

Comments -

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/18/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8260B

**CALCULATIONS**

Tune ID: 15051216, BFBRK 5/12/2016 07:25
Recalculated Ion Ratio: 174:95
Reported Ratio: 95.00%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 148416
Reference Mass Response = 156150

Relative Abundance = 95.05% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: RE06021 | Date: 10/18/17
Lab: Shealy Environmental Services | Page: 1 of 1
Client: USACE | Validated by: JP
Second Review by: LS

**Method:** SW8260B

**CALCULATIONS**

RRF Standard ID: 0.5 ug/L
Compound ID: Vinyl Chloride
Reported Result: 0.363552

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 1459
I.S. Area = 399738
Compound Conc. = 0.5
I.S. Conc. = 50

RRF = 0.364989
Close Match

Calibration ID: 8260B-15.M
Compound ID: Tetrachloroethene
%RSD: 4.7%
Average RRF = 0.298695

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 0.275984
RF Level 2 = 0.293753
RF Level 3 = 0.297187
RF Level 4 = 0.304250
RF Level 5 = 0.318808
RF Level 6 = 0.302186

Standard Deviation = 0.014
Average RRF = 0.298695 Matches
%RSD = 4.711 Matches

Comments: Chloroethane used a linear regression with r= 0.994

**GC/MS VALIDATION WORKSHEET**
**INITIAL/CONTINUING CALIBRATION VERIFICATION**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/18/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8260B

**CALCULATIONS**

RRF Standard ID: VSTD050RK 5/12/2016 08:01
Compound ID: 1,1-DCE
Reported Result: 0.375131

%D Standard ID: VSTD050RK 5/12/2016 08:01
Compound ID: cis-1,2-DCE
Reported %D: -2.3%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 149695
I.S. Area = 399047
Compound Conc. = 50
I.S. Conc. = 50

Average RRF = 0.45236
CCV RRF = 0.44208
%D = 2.3 Matches

CCV RRF = 0.375131 Matches

%D Indicating Bias = -2.3

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/18/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8260B

**CALCULATIONS**

Sample ID: CDL-DPW14-00-3140
Compound ID: Toluene-d8
Reported Result: 99%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 52.46
Surr. Spike Conc. = 53.00

% Recovery = 99 Matches

Comments:
The lab did not report the concentration of spiked surrogate, 53 ug/L was assumed based on reported % recovery

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: RE06021
Lab: Shealy Environmental Services
Client: USACE

Date: 10/18/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW8260B

### CALCULATIONS

Sample ID: CDL-DPW14-01-3140 MS
Compound ID: Bromoform
Recovery: 88%

Sample ID: CDL-DPW14-01-3140 MS/MSD
Compound ID: Chloroethane
RPD: 4.9%

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS = 880.30
Unspiked Samp. = 0.0
MS Spike Conc. = 1000.0

% Recovery = 88.0% Matches

MS Conc. = 1098.02
MSD Conc. = 1045.91

RPD = 4.9% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: RE06021
Lab: Shealy Environmental Services
Client: USACE

Date: 10/18/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW8260B

**CALCULATIONS**

Sample ID: RQ13052-002
Compound ID: Benzene
Recovery: 92%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 46.23
LCS Spike Conc. = 50.00

% Recovery = 92 Matches

Comments: LCS only

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/18/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8260B

**CALCULATIONS**

Sample ID: CDL-DPW14-00-3140
Compound ID: Ethylbenzene
Reported Result: 630 µg/L

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 139442 | Area |
| Area I.S. = | 460405 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.4776 | NA |
| Final Volume = | 5.0 | mL |
| Initial Amount = | 5.0 | |
| Dilution Factor = | 20 | NA |
| Conc. In Sample = | 634.12 | |
| | Match | |

Comments: The lab report did not include an intial or final volue, so 5.0 ml was assumed

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8270D

**CALCULATIONS**

Tune ID: DFTPPAN 5/19/2016 08:35
Recalculated Ion Ratio: 443:442
Reported Ratio: 19.3%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 172288
Reference Mass Response = 894016

Relative Abundance = 19.3% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8270D

**CALCULATIONS**

RRF Standard ID: SVMS 2071 (Level 3)
Compound ID: Naphthalene
Reported Result: 1.091855

Calibration ID: 11051016C (MSD-11)
Compound ID: Acenapthene
%RSD: 2.1%
Average RRF = 1.35681

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

Compound Area = 169679
I.S. Area = 1554043
Compound Conc. = 2.0
I.S. Conc. = 20

RF Level 1 = 1.370019
RF Level 2 = 1.355413
RF Level 3 = 1.330222
RF Level 4 = 1.314234
RF Level 5 = 1.350461
RF Level 6 = 1.382104
RF Level 7 = 1.346460
RF Level 8 = 1.405550

RRF = 1.091855
Matches

Standard Deviation = 0.029
Average RRF = 1.356808 Matches
%RSD = 2.1 Matches

Comments:
The lab flagged 2,4-Dichlorophenol and benzo(a)pyrene for low RF, but both analytes met criteria.
(> 0.05)

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |
| **Method:** | SW8270D | | |

**CALCULATIONS**

| | | | |
|---|---|---|---|
| RRF Standard ID: | SVMS 2073 MSD-11 | %D Standard ID: | SVMS 2073 MSD-11 |
| Compound ID: | Acenapthylene | Compound ID: | Acenapthene |
| Reported Result: | 2.02251 | Reported %D: | 2.0% |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

| | | | |
|---|---|---|---|
| Compound Area = | 671797 | Average RRF = | 1.356808 |
| I.S. Area = | 664320 | CCV RRF = | 1.38439 |
| Compound Conc. = | 10 | | |
| I.S. Conc. = | 20 | %D = | -2.03 Matches |

CCV RRF = 2.02251 Matches %D Indicating Bias = 2.0

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8270D

**CALCULATIONS**

Sample ID: CDL-DPW16-01-2130
Compound ID: 2-Fluorobiphenyl
Reported Result: 28%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 2.8362
Surr. Spike Conc. = 10.20

% Recovery = 28 Matches

Comments: Surrogate spike concentrations were not documented in the lab report, therefore 10.2 was assumed

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: RE06021
Lab: Shealy Environmental Services
Client: USACE

Date: 10/19/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW8270D

### CALCULATIONS

Sample ID: CDL-DPW16-00-213 MS
Compound ID: Acenapthene
Recovery: 67%

Sample ID: CDL-DPW16-00-213 MS/MSD
Compound ID: 4-Chloroaniline
RPD: 18%

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS = 15.26
Unspiked Samp. = 0.0
MS Spike Conc. = 23.0

% Recovery = 66.4% Close Match

MS Conc. = 14.15
MSD Conc. = 11.80

RPD = 18.1 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: RE06021
Lab: Shealy Environmental Services
Client: USACE

Date: 10/19/17
Page: 1 of 1
Validated by: JP
Second Review by: LS

**Method:** SW8270D

**CALCULATIONS**

Sample ID: RQ12891-002
Compound ID: 2-Methylnaphthalene
Recovery: 60%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 5.96
LCS Spike Conc. = 10.00

% Recovery = 59.6% Matches

Comments: LCS only

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RE06021 | Date: | 10/19/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | LS |

**Method:** SW8270D

**CALCULATIONS**

Sample ID: CDL-DPW14-01-3140
Compound ID: 2-Methylnaphthalene
Reported Result: 52.0

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \text{Dilution Factor}$$

| | | Units |
|---|---|---|
| Area Sample = | 3760755 | Area |
| Area I.S. = | 2143356 | Area |
| Conc. I.S. = | 20 | |
| Average RRF = | 0.678615 | NA |
| Final Volume = | 1.0 | mL |
| Initial Amount = | 1000.0000 | L |
| Dilution Factor = | 1.0 | NA |

Conc. In Sample = 51.7115
Matches

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q2 |
| SDG: | 9165_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RB1-03-051016 | 9165009 | Water | Equipment Blank/EB | X |
| CDL-DPW15-00-3140 | 9165003 | Water | Field Sample/N | X |
| CDL-DPW16-00-2130 | 9165001 | Water | Field Sample/N | X |
| CDL-DPW16-01-2130 | 9165002 | Water | Field Sample/N | X |
| CDL-DPW17-00-1928 | 9165004 | Water | Field Sample/N | X |
| CDL-TP27A-00-004 | 9165005 | Solid | Field Sample/N | X |
| CDL-TP27A-01-004 | 9165008 | Solid | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 9165_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 5 results (4.20%) out of the 119 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

The laboratory noted that MS/MSD recoveries and RPDs were outside control limits.

| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | No additional comments; see Checklist for detail. |

November 17, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12016100 (LB)/ 12016100 | Octachlorodibenzo -p-dioxin | 4.730 | < 3.34 | < 10 | pg/g | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method E1613, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 (MS)/ 9165006 | Octachlorodibenzo-p-dioxin | -2960 | 93 - 162 | 10 - 162 | percent | J/UJ | M | Spike amount Insignificant |
| CDL-TP27A-00-004 (MS)/ 9165006 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 24.30 | 93 - 144 | 10 - 144 | percent | J/R | M | Spike amount Insignificant |
| CDL-TP27A-00-004 (MS)/ 9165006 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 85.40 | 91 - 131 | 10 - 131 | percent | J/UJ | M | |
| CDL-TP27A-00-004 (SD)/ 9165007 | Octachlorodibenzo-p-dioxin | -1530 | 93 - 162 | 10 - 162 | percent | J/UJ | M | Spike amount Insignificant |
| CDL-TP27A-00-004 (SD)/ 9165007 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 12.00 | 93 - 144 | 10 - 144 | percent | J/R | M | Spike amount Insignificant |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 | N | 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 4.69 | 45.4 | 45.4 J | - | pg/g | M |
| CDL-TP27A-01-004 | N | 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 4.45 | 41.2 | 41.2 J | - | pg/g | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method E1613, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 9165007 (SD)/ 9165007 | Octachlorodibenzo -p-dioxin | 31.74 | < 20 | < 20 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 | N | Octachlorodibenzo-p-dioxin | 9.37 | 12600 E | 12600 J | | pg/g | D |
| CDL-TP27A-01-004 | N | Octachlorodibenzo-p-dioxin | 8.91 | 8950 E | 8950 J | | pg/g | D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

**Test Method: E1613 Extraction Method: SW3540C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-TP27A-00-004 | N | 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 4.69 | 45.4 | 45.4 J | - | pg/g | M |
| CDL-TP27A-00-004 | N | Octachlorodibenzo-p-dioxin | 9.37 | 12600 E | 12600 J | | pg/g | D |
| CDL-TP27A-01-004 | N | 1,2,3,4,6,7,8-Heptachlorodibenzofuran | 4.45 | 41.2 | 41.2 J | - | pg/g | M |
| CDL-TP27A-01-004 | N | Octachlorodibenzo-p-dioxin | 8.91 | 8950 E | 8950 J | | pg/g | D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| D | MS RPD |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | Samples #5 and #8 reported over-range values for OCDD; therefore, they were qualified as estimated. |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 9165
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b04may16b-3
Compound ID: 2378-TCDD
Reported Result: 1.035

Calibration ID: b04may16b
Compound ID: 2378-TCDD
%RSD: 2.40113%
Average RRF = 1.01656

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%RSD = Standard Deviation / Average RRF X 100

Compound Area = 2540
I.S. Area = 983000
Compound Conc. = 0.25
I.S. Conc. = 100

RRF = 1.0336
Matches

RF Level 1 = 1.035
RF Level 2 = 1.040
RF Level 3 = 0.989
RF Level 4 = 0.988
RF Level 5 = 1.038
RF Level 6 = 1.008
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.024
Average RRF = 1.016 Matches
%RSD = 2.409 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: 9165
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b11aug15a-1
Compound ID: 2378-TCDD
Reported Result: 0.951

Standard ID: b31may16b-1
Compound ID: 2378-TCDD
Reported %D: -6.4%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{(\text{CCV RRF - ICV RRF})}{\text{ICV RRF}} \times 100$$

Compound Area = 103000
I.S. Area = 1090000
Compound Conc. = 10
I.S. Conc. = 100

IC RRF = 1.017
CCV RRF = 0.951
%D = -6.49 Matches

CCV RRF = 0.945 Matches

%D Indicating Bias = 6.49

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: 9165
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 9165001
Compound ID: 13C-2,3,7,8-TCDD
Reported Result: 77.1%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 1660
Surr. Spike Conc. = 2150

% Recovery = 77.2 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: 9165
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | 9165006 | Sample ID: | 9165006/9165007 |
| Compound ID: | 2378-TCDD | Compound ID: | 2378-TCDD |
| Recovery: | 90.6 | RPD: | 0.759 |

% Recovery = $\frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$

RPD = $\frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$

Conc. MS = 18.3
Unspiked Samp. = 1.4
MS Spike Conc. = 18.7

% Recovery = 90.5 Matches

MS Conc. = 18.3
MSD Conc. = 18.1

RPD = 1.1 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 9165
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 12016101
Compound ID: 2378-TCDD
Recovery: 92.4%

Sample ID: 12016101/12016102
Compound ID: 2378-TCDD
RPD: 0.508

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 18.5
LCS Spike Conc. = 20.0

LCS Conc. = 18.5
LCSD Conc. = 18.6

% Recovery = 92.5 Matches

RPD = 0.5 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 9165 | Date: | 11/18/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: 8000001
Compound ID: TCDD
Reported Result: 1.38 pg/L

Conc. In Sample = $\frac{\text{Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor}}{\text{Area IS X RF X Initial Volume}}$

| | | Units |
|---|---|---|
| Area Sample = | 4940 | Area |
| Area I.S. = | 662000 | Area |
| Conc. I.S. = | 100 | |
| Average RRF = | 1.0166 | |
| Final Volume = | 0.020 | mL |
| Initial Amount = | 13.4600 | g |
| Dilution Factor = | 1.0 | NA |
| Solids = | 79.253 | |
| Conc. In Sample = | 0.00138 | |
| | Matches | |

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q3 |
| SDG: | RH18018 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Amy Bass, Data Review Chemist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | December 04, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C - Dissolved | SW7470A - Dissolved | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|
| CDL-DTW1-00-119128 | RH18018-003 | Water | Field Sample/N | X | X | X | X |
| CDL-DTW1-01-119128 | RH18018-004 | Water | Field Sample/N | X | X | X | X |
| CDL-DTW2-00-17116 | RH18018-006 | Water | Field Sample/N | X | X | X | X |
| CDL-DTW3-00-097106 | RH18018-007 | Water | Field Sample/N | X | X | X | X |
| CDL-DTW4-00-101110 | RH18018-001 | Water | Field Sample/N | X | X | X | X |
| CDL-TB1-03-081716 | RH18018-002 | Water | Trip Blank/TB | | | X | |
| CDL-TB2-03-081916 | RH18018-005 | Water | Trip Blank/TB | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RH18018. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 139 results (18.31%) out of the 759 results (sample and field QC samples) reported are qualified based on review and 2 results (0.26%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Missing and broken amber bottles were noted in COC 63998 and were delivered in a separate cooler with COC 64008.

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The lab narrated the following:<br><br>The ICSA verification standard associated with samples -006 and -007 contained zinc at 0.022 mg/L which was marginally greater than the LOQ of 0.020 mg/L. Since there are no interferences for zinc, the likely source of the trace zinc contamination was confined to the ICSA solution, which will be monitored.<br><br>Sodium was present greater than the limit of detection of 1.0 mg/L, but was less than half the limit of quantitation concentration of 2.5 mg/L in the CCBs analyzed on 09/01/2016 at 18:35 (1.5 mg/L) and 19:30 (1.5 mg/L). |
| SW7470A | No additional comments; see Checklist for detail. |
| SW8260B | The lab narrated the following:<br><br>The ICV associated with samples -001 through -005 recovered marginally high for DCDFM (123%). There were no detections in the samples. Also, the ICV associated with samples -006 and -007 recovered high for DCDFM (123%), the CCV also recovered high for TCFM (24%), but all samples<br>were ND.<br><br>The LCSD was not reported because of poor recoveries caused by the sample that was analyzed right before it. The CCV, LCS, and ending CCV all passed recovery. |
| SW8270D | The lab narrated the following:<br><br>Sample -004 failed low for the recovery of the surrogate Terphenyl-d14. The sample is re-extracted and reanalyzed within hold and surrogate still failed confirming matrix interference.<br><br>The LCS associated with sample -007 failed low for 3,3-Dichlorobenzidine. The sample is re-extracted outside the holding time. The LCS associated with the re-extracts still failed low for 3,3-Dichlorobenzidine and 3 additional analytes. No sample remained for a third extraction.<br><br>Sample -006 along with associated MS/MSD failed low for surrogate recovery. Insufficient sample was left to re-extract. |

November 17, 2017

Reviewed by Amy Bass, Data Review Chemist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

December 04, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ21125-001 (LB)/ RQ21125-001 | Zinc | 0.003900 | < 0.0022 | < 0.02 | mg/l | U/None | L | |
| RQ21125-001 (LB)/ RQ21125-001 | Manganese | 0.007200 | < 0.00081 | < 0.015 | mg/l | U/None | L | |
| RQ21125-001 (LB)/ RQ21125-001 | Calcium | 0.1400 | < 0.13 | < 5 | mg/l | U/None | L | |
| RQ21125-001 (LB)/ RQ21125-001 | Magnesium | 0.3600 | < 0.26 | < 5 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | Chloroethane | 136.0 | 30 - 135 | 20 - 135 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, Trip Blank**

The purpose of trip blanks is to determine the existence and magnitude of cross-contamination problems resulting from the shipping of samples. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in trip blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-TB1-03-081716 (TB)/ RH18018-002 | Bromoform | 0.6100 | < 0.4 | < 1 | ug/l | U/None | T | |
| CDL-TB1-03-081716 (TB)/ RH18018-002 | 1,2-Dichloroethane | 2.900 | < 0.4 | < 1 | ug/l | U/None | T | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| ICV 19-Jul-2016 21:03 (IV) | 2,4-Dinitrophenol | 75.00 | 80 - 120 | 80 - 120 | percent | J/UJ | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration Verification for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW1-00-119128 | N | 2,4-Dinitrophenol | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | V1 |
| CDL-DTW1-01-119128 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I/V1 |
| CDL-DTW4-00-101110 | N | 2,4-Dinitrophenol | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ20871-002 (BS)/ RQ20871-002 | 3,3'-Dichlorobenzidine | 6.800 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW3-00-097106 | N | 3,3'-Dichlorobenzidine | 5.60 | 2.20 L U | 2.20 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | 3,3'-Dichlorobenzidine | 10.00 | 20 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | Hexachlorocyclopentadiene | 14.55 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | n-Nitrosodiphenylamine | 32.73 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | Biphenyl (Diphenyl) | 47.27 | 49 - 109 | 10 - 109 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | Benzo(a)pyrene | 47.27 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | 4-Chlorophenyl phenyl ether | 48.18 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (SD)/ RH18018-006MD | Dibenzofuran | 54.55 | 55 - 150 | 10 - 150 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 2,4-Dinitrophenol | 10.18 | 14 - 140 | 10 - 140 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 4,6-Dinitro-2-methylphenol | 12.00 | 40 - 130 | 10 - 130 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | Hexachlorocyclopentadiene | 13.45 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 3,3'-Dichlorobenzidine | 19.55 | 20 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | Pentachlorophenol | 21.82 | 40 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | m,p-Cresol | 23.18 | 30 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 2-Nitrophenol | 24.55 | 40 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 2,6-Dinitrotoluene | 29.55 | 50 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 2-Nitroaniline | 30.00 | 50 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | 4-Nitroaniline | 30.91 | 35 - 120 | 10 - 120 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | Biphenyl (Diphenyl) | 47.27 | 49 - 109 | 10 - 109 | percent | J/UJ | M | |
| CDL-DTW2-00-17116 (MS)/ RH18018-006MS | Benzo(a)pyrene | 50.91 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-DTW4-00-101110 (SD)/ RH18018-001MD | n-Nitrosodiphenylamine | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-DTW4-00-101110 (SD)/ RH18018-001MD | Nitrobenzene | 112.0 | 45 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-DTW4-00-101110 (SD)/ RH18018-001MD | 3-Nitroaniline | 18.00 | 20 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-DTW4-00-101110 (SD)/ RH18018-001MD | 4-Nitroaniline | 33.60 | 35 - 120 | 10 - 120 | percent | J/UJ | M | |
| CDL-DTW4-00-101110 (SD)/ RH18018-001MD | 3,3'-Dichlorobenzidine | 6.000 | 20 - 110 | 10 - 110 | percent | J/R | M | |

### Quality Control Outliers for test method SW8270D, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW4-00-101110 (MS)/ RH18018-001MS | 3,3'-Dichlorobenzidine | 10.43 | 20 - 110 | 10 - 110 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

### Qualified Results associated with the MS Recovery for SW8270D

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-17116 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QS U | 0.920 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QS U | 2.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Benzo(a)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2,4-Dinitrophenol | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 QS U | 1.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2-Nitrophenol | 2.00 | 0.800 QS U | 0.800 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | m,p-Cresol | 2.00 | 2.00 QS U | 2.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Pentachlorophenol | 2.00 | 1.50 QS U | 1.50 UJ | - | ug/l | M/I |
| CDL-DTW4-00-101110 | N | 3-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-DTW4-00-101110 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 R | - | ug/l | M |
| CDL-DTW4-00-101110 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 R | - | ug/l | M |
| CDL-DTW4-00-101110 | N | 4-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

### Quality Control Outliers for test method SW8270D, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH18018-001MD (SD)/ RH18018-001MD | 3-Nitroaniline | 102.7 | < 30 | < 30 | rpd | J/None | D | |

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH18018-001MD (SD)/ RH18018-001MD | n-Nitrosodiphenylamine | 200.0 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-001MD (SD)/ RH18018-001MD | 2,4-Dimethylphenol | 30.30 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-001MD (SD)/ RH18018-001MD | 4-Nitroaniline | 35.29 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-001MD (SD)/ RH18018-001MD | 4-Chloroaniline | 43.48 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-001MD (SD)/ RH18018-001MD | 3,3'-Dichlorobenzidine | 46.15 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-006MD (SD)/ RH18018-006MD | 3,3'-Dichlorobenzidine | 118.5 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-006MD (SD)/ RH18018-006MD | 2,4-Dimethylphenol | 32.26 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-006MD (SD)/ RH18018-006MD | 4-Chloroaniline | 36.84 | < 30 | < 30 | rpd | J/None | D | |
| RH18018-006MD (SD)/ RH18018-006MD | n-Nitrosodiphenylamine | 50.00 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW1-01-119128 (N)/ RH18018-004 | Terphenyl-d14 | 33.25 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-DTW2-00-17116 (N)/ RH18018-006 | 2-Fluorobiphenyl | 42.24 | 44 - 119 | 10 - 119 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW1-01-119128 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I/V1 |
| CDL-DTW1-01-119128 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Methylnaphthalene | 0.200 | 1.50 Q | 1.50 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Acenaphthene | 0.200 | 0.190 JQ | 0.190 J | - | ug/l | I/TR |
| CDL-DTW1-01-119128 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 0.440 JQ | 0.440 J | - | ug/l | I/TR |
| CDL-DTW1-01-119128 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW1-01-119128 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Fluorene | 0.200 | 0.230 Q | 0.230 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Naphthalene | 0.200 | 1.70 Q | 1.70 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Phenanthrene | 0.200 | 0.470 Q | 0.470 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4-Dinitrophenol | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 QS U | 1.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 QS U | 1.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2-Nitrophenol | 2.00 | 0.800 QS U | 0.800 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QS U | 2.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 3-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4-Chloroaniline | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-17116 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Nitrophenol | 5.00 | 2.00 QS U | 2.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(a)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | m,p-Cresol | 2.00 | 2.00 QS U | 2.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QS U | 0.920 UJ | - | ug/l | M/I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-17116 | N | Pentachlorophenol | 2.00 | 1.50 QS U | 1.50 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DTW1-00-119128 | N | 2,4-Dinitrophenol | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | V1 |
| CDL-DTW1-01-119128 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I/V1 |
| CDL-DTW1-01-119128 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Methylnaphthalene | 0.200 | 1.50 Q | 1.50 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Acenaphthene | 0.200 | 0.190 JQ | 0.190 J | - | ug/l | I/TR |
| CDL-DTW1-01-119128 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 0.440 JQ | 0.440 J | - | ug/l | I/TR |
| CDL-DTW1-01-119128 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DTW1-01-119128 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Fluorene | 0.200 | 0.230 Q | 0.230 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Naphthalene | 0.200 | 1.70 Q | 1.70 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Phenanthrene | 0.200 | 0.470 Q | 0.470 J | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW1-01-119128 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 QS U | 0.920 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 QS U | 1.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 3-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4-Chloroaniline | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Nitrophenol | 5.00 | 2.00 QS U | 2.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-17116 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(a)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-DTW2-00-17116 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QS U | 2.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2,4-Dinitrophenol | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 QS U | 1.00 UJ | - | ug/l | M/I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DTW2-00-17116 | N | 2-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 2-Nitrophenol | 2.00 | 0.800 QS U | 0.800 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | 4-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | m,p-Cresol | 2.00 | 2.00 QS U | 2.00 UJ | - | ug/l | M/I |
| CDL-DTW2-00-17116 | N | Pentachlorophenol | 2.00 | 1.50 QS U | 1.50 UJ | - | ug/l | M/I |
| CDL-DTW3-00-097106 | N | 3,3'-Dichlorobenzidine | 5.60 | 2.20 L U | 2.20 UJ | - | ug/l | C |
| CDL-DTW4-00-101110 | N | 2,4-Dinitrophenol | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | V1 |
| CDL-DTW4-00-101110 | N | 3-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-DTW4-00-101110 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 R | - | ug/l | M |
| CDL-DTW4-00-101110 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 R | - | ug/l | M |
| CDL-DTW4-00-101110 | N | 4-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| D | MS RPD |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| T | Trip Blank |
| TR | Trace Level Detect |
| V1 | ICV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on each (of 4) COCs, |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | Sodium detected in 2 CCBs, however detects in associated samples were reanalyzed. No action taken on this basis. |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | RL anomalies noted. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on each (of 4) COCs, |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Reporting limits were greater than project quantitation limits. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on each (of 4) COCs, |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | RF for Acetonitrile in level 1 of ICAL below 0.05; no action taken on this basis. |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | High (23.3%) for Dichlorodifluoromethane; all samples ND for this compound.<br>Low (-35.7%) for Acrolein; note in ICAL runlog states passing ICV for Acrolein in subsequent ICV - not presented. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Reporting limits were greater than project quantitation limits. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on each (of 4) COCs, |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Reporting limits were greater than project quantitation limits. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH18018 Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

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**Recalculation of Initial Calibration (ICAL) Correlation Coefficient:**

| | |
|---|---|
| **Calibration ID:** | 8/26/2016 |
| **Analyte:** | Arsenic |

| Sample Name | TRUE | Found | (S)IR * |
|---|---|---|---|
| Blank | 0 | 0 | 0.00099 |
| CAL1 MW-8057 | 0.500 | 0.49707 | 0.07171 |
| CAL2 MW-8064 | 1.000 | 1.00750 | 0.14431 |
| CAL3 MW-8065 | 0.015 | 0.01399 | 0.00297 |
| CAL4 MW-8020 | 0.100 | 0.09647 | 0.01472 |

| | | | |
|---|---|---|---|
| **Reported Correlation:** | | 0.999919 | |
| **Calculated:** | $R^2$ = | 0.999954 | |
| | R = | 0.999977 | ***Match*** |

* Each IR Signal value is the average of 3 readings.

---

**QC Element: Initial Calibration Verificaton (ICV)**

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Conc.<br>(Calc'd) * | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|
| **ICV1 - 9/1/2016 12:58** | | | | | | **(p.881, 1480)** |
| Barium | 2.5000 | **2.6441** | **2.6442**<br>***Match*** | **106** | **106**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

%R - Percent Recovered = 100% × FOUND / TRUE

* Average of 3 readings

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# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH18018 Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verificaton (CCV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Conc.<br>(Calc'd) * | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|
| **CCV3 - 8/26/2016 19:13** | | | | | | **(p.880, 1219)** |
| Copper | 2.5000 | **2.6289** | **2.6290**<br>***Match*** | **105** | **105**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

%R - Percent Recovered = 100% × FOUND / TRUE * Average of 3 readings

### QC Element: Interference Check Sample (ICS) - A/AB

| Analyte | TRUE<br>Conc'n | Reported<br>Result / A | %Rec / A<br>(Reported) | %Rec / A<br>(Calc'd) | Reported<br>Result / AB | %Rec / AB<br>(Reported) | %Rec / AB<br>(Calc'd) |
|---|---|---|---|---|---|---|---|
| Calcium | 500 | 478 | **96** | **96**<br>***Match*** | 476 | **95** | **95**<br>***Match*** |

%R - Percent Recovered = 100% × FOUND / TRUE

### QC Element: Laboratory Control Sample (LCS)

| Analyte | LCS Spike<br>Added | LCS<br>Result | %Rec<br>(Reported) | %Rec<br>(Calc'd) | Note |
|---|---|---|---|---|---|
| **LCS / Batch 20635 (8/26/2016 18:55) - RQ20635-002** | | | | | |
| Lead | 0.40 | 0.40660<br>* | **102** | **102**<br>***Match*** | Control Limits:<br>75 - 125 |

%R - Percent Recovered = 100% × ( Result / Spike Added ) * Average of 3 readings

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH18018 Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**Recalculation of Sample Results:**

| Lab Sample ID<br>Analyte | Raw<br>Conc. * | Dilution<br>Factor | Conc.<br>(Reported) | Conc.<br>(Calc'd) * |
|---|---|---|---|---|
| **RH18018-003 / CDL-DTW1-00-119128 (8/26/2016 19:04)** | | | | |
| Iron (Dissolved) | 9.8297<br>* | 1 | **9.8** | **9.8**<br>***Match*** |
| **RH18018-006 / CDL-DTW2-00-17116 (9/1/2016 19:59)** | | | | |
| Sodium (Dissolved) | 12.699<br>* | 1 | **13** | **13**<br>***Match*** |

* Average of 3 results.

Concentration = ( Raw Conc. ) × Dilution

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water | Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### Recalculation of Initial Calibration (ICAL) Correlation Coefficient:

| | |
|---|---|
| **Date:** | 8/31/2016 |
| **Analyte:** | Mercury |

| Sample Name | TRUE | Found | Response |
|---|---|---|---|
| Blank | 0.000 | -0.013 | 16 |
| CAL 0.1- 16HG0939 | 0.100 | 0.117 | 770 |
| CAL 0.2- 16HG0938 | 0.200 | 0.195 | 1217 |
| CAL 1.0- 16HG0937 | 1.000 | 1.003 | 5890 |
| CAL 2.0- 16HG0936 | 2.000 | 1.998 | 11636 |
| CAL 5.0- 16HG0935 | 5.000 | 5.000 | 28977 |

| | Reported | Calc'd | |
|---|---|---|---|
| $R^2$ | NA | 0.999972 | |
| Correlation (R) | 0.999986 | 0.999986 | ***Match*** |
| Slope (B) | 1.731E-04 | 1.731E-04 | ***Match*** |
| Intercept (C) | -1.6051E-02 | -1.6051E-02 | ***Match*** |

### QC Element: Initial Calibration Verificaton (ICV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **ICV1 - 8/31/2016 08:50** | | | | | | | |
| Mercury | 0.002000 | **0.001884** | **10978** | **0.001884**<br>***Match*** | **94** | **94**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × FOUND / TRUE

| | |
|---|---|
| B: | 1.731E-04 |
| C: | -1.6051E-02 |

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verificaton (CCV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **CCV2 - 8/31/2016 11:27** | | | | | | | |
| Mercury | 0.002000 | **0.002186** | **12722** | **0.002186**<br>***Match*** | **109** | **109**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × FOUND / TRUE

B: 1.731E-04
C: -1.6051E-02

### QC Element: Laboratory Control Sample (LCS)

| Analyte | Dilution<br>Factor | LCS Spike<br>Added | LCS Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %Rec<br>(Reported) | %Rec<br>(Calc'd) | Note |
|---|---|---|---|---|---|---|---|---|
| **LCS / Batch 20976 (8/31/2016 11:44) - RQ20976-002** | | | | | | | | |
| Mercury | 1 | 0.0020 | 0.0023 | **13230** | **0.002274**<br>***Match*** | **114** | **114**<br>***Match*** | Control Limits:<br>75 - 125 |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × ( Result / Spike )

B: 1.731E-04
C: -1.6051E-02

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| **MS/MSD / Batch 20976 (8/31/2016 12:33/12:38) - RH18018-006MS/RH18018-006MD** | | | | | | |
| Mercury (Dissolved) | ND (0) | 0.0020 | 0.0023355 | **117** | **117** ***Match*** | ok (75 - 125) |

MS/MSD Sample ID = RH18018-006

%Rec = Percent Recovery
= 100% × ( Result / Spike Added )

RPD = Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

| MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|
| 0.0023814 | **119** | **119** ***Match*** | ok (75 - 125) |

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **1.9** | **1.9** ***Match*** | ok (< 30) |

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH18018 Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**Recalculation of Sample Results:**

| Lab Sample ID<br>Analyte | Instrument Response | Dilution Factor | Raw Conc'n | Conc. (Reported) | Conc. (Calc'd) | |
|---|---|---|---|---|---|---|
| **RH18018-004 / CDL-DTW1-01-119128 (8/31/2016 12:29)** | | | | | | |
| Mercury | 44 | 1 | **-0.0084** | **0.00010 U** | **-0.0000084**<br>***Match*** | * |

Raw Conc. = ( Response × B ) + C

B: 1.731E-04
C: -1.605E-02

Concentration = ( Raw Conc. ) × ( 0.001 mg/µg ) × Dilution

* The calculated concentration is < LOD; therefore the result was reported as ND (U qualified).

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**Recalculation of Initial Calibration (ICAL) RFs, Mean RF, RSD:**

IS Internal Standard: 1,4-Difluorobenzene

| Analyte | | Lvl#1 | Lvl#2 | Lvl#3 | Lvl#4 | Lvl#5 | Lvl#6 | Lvl#7 | Lvl#8 | Lvl#9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Benzene** | | | | | | | | | | |
| | **Conc. [STD]:** | | 1 | 5 | 20 | 50 | 100 | 200 | | |
| | **Response:** | | 7362 | 35008 | 139947 | 369629 | 745792 | 1585541 | | |
| | **Conc. [IS]:** | | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | | |
| | **Response [IS]:** | | 303646 | 296895 | 301308 | 308081 | 321316 | 333892 | | |
| | **Reported RF:** | | **1.212267** | **1.179137** | **1.161162** | **1.199779** | **1.160527** | **1.187166** | | |
| ***Match*** | **Calc'd RF:** | | **1.212267** | **1.179137** | **1.161162** | **1.199779** | **1.160527** | **1.187166** | | |

| | | Mean RF | RF RSD | Note |
|---|---|---|---|---|
| | **Reported:** | **1.183340** | **1.8** | |
| | **Calc'd:** | **1.183340** | **1.8** | ***Match*** |

RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )
RSD Relative Sandard Deviation = 100% × STDev(RF) / (Mean RF)

**QC Element: Initial Calibration Verificaton (ICV)**

IS Internal Standard: Pentafluorobenzene

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Mean RF<br>[ICAL] | Response<br>(Area) | Conc.<br>[IS] | Response<br>[IS] | Conc.<br>(Reported) | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **ICV Sample: 16-Aug-2016 14:19:30** | | | | | | | | | |
| Acetone | 100 | 0.238404 | 100598 | 50.000 | 204364 | **103.24** | **103.24**<br>***Match*** | **103** | **103**<br>***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS])

%R Percent Recovered = 100% × FOUND / TRUE

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verification (CCV)

IS Internal Standard: Chlorobenzene-d5

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Conc. [STD] | Response | RF (Reported) | RF (Calc'd) | %D (Reported) | %D (Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **CCV Sample: 30-Aug-2016 19:30:30** | | | | | | | | | |
| **Toluene** | | | | | | | | | |
| | 0.760796 | 50.00 | 282191 | 50 | 214011 | **0.758391** | **0.758391** ***Match*** | **-0.3** | **-0.3** ***Match*** |

%D Percent Difference = 100% × ( RF – Mean RF [ICAL] ) / ( Mean RF [ICAL] )
RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )

### QC Element: Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD)

| Analyte | LCS Spike Added | LCS Result | %Rec (Reported) | %Rec (Calc) | Note |
|---|---|---|---|---|---|
| Carbon Disulfide | 20 | 23 (p.38) | **115** | 115 ***Match*** | ok (35 - 160) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

MS/MSD Sample ID = CDL-DTW2-00-17116

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Carbon Disulfide | 0.44 | 50 | 61.696 | **123** | **123** *Match* | ok (35 - 160) |

| MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|
| 60.149 | **119** | **119** *Match* | ok (35 - 160) |

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **2.5** | **2.5** *Match* | ok (< 30) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

**Recalculation of Sample Results:**

IS Internal Standard: Chlorobenzene-d5

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Dilution | Response (pdf-pg) | Conc. (Reported) (µg/L) | Conc. (Calc'd) (µg/L) |
|---|---|---|---|---|---|---|---|
| **Lab Sample ID: RH18018-003 (CDL-DTW1-00-119128)** | | | | | | | |
| Ethylbenzene | 0.448078 | 50.00 | 256750 | 1 | 6706 | **2.9** | **2.9** *Match* |

Conc. (µg/L) = Dilution × ( Response × Conc. [IS] ) / ( Response [IS] × Mean RF [ICAL] )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**Recalculation of Initial Calibration (ICAL) RFs, Mean RF, RSD:**

IS Internal Standard: Acenaphthene-d10

| Analyte | | Lvl#1 | Lvl#2 | Lvl#3 | Lvl#4 | Lvl#5 | Lvl#6 | Lvl#7 | Lvl#8 | Lvl#9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Acenaphthene | | ICAL - 7/19/2016 | | | | | | | | |
| | Conc.: [STD] | 0.2 | 1 | 2 | 5 | 10 | 15 | 20 | 25 | 30 |
| | Response: | 19970 | 120749 | 240169 | 658253 | 1314301 | 2414103 | 2898671 | 3745665 | 5210669 |
| | Conc. [IS]: | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| | Response [IS]: | 1561924 | 1688360 | 1730985 | 1914933 | 1936276 | 2311532 | 2099662 | 2172139 | 2693240 |
| | Reported RF: | **1.278551** | **1.430370** | **1.387470** | **1.374989** | **1.357555** | **1.392498** | **1.380542** | **1.379530** | **1.289814** |
| *Match* | Calc'd RF: | **1.278551** | **1.430370** | **1.387470** | **1.374989** | **1.357555** | **1.392498** | **1.380542** | **1.379530** | **1.289814** |

| | | Mean RF | RF RSD | Note |
|---|---|---|---|---|
| | Reported: | **1.363480** | **3.6** | |
| | Calc'd: | **1.363480** | **3.6** | ***Match*** |

RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )
RSD Relative Sandard Deviation = 100% × STDev(RF) / (Mean RF)

**QC Element: Initial Calibration Verificaton (ICV)**

IS Internal Standard: Acenaphthene-d10

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Mean RF<br>[ICAL] | Response<br>(Area) | Conc.<br>[IS] | Response<br>[IS] | Conc.<br>(Reported) | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| Sample ICV 1: 19-Jul-2016 21:03:30 | | | | | | | | | |
| Fluorene | 25 | 1.564871 | 838582 | 20.000 | 2017849 | **26.557** | **26.557**<br>***Match*** | **106.2** | **106.2**<br>***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS]) × Final Vol / (Extracted Vol × Injected Vol)
%R Percent Recovered = 100% × FOUND / TRUE Final Vol = 5000 µL Extracted Vol = 1000 mL Injected Vol = 1 µL

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verification (CCV)

IS Internal Standard: 1,4-Dichlorobenzene-d4

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Conc. [STD] | Response | RF (Reported) | RF (Calc'd) | %D (Reported) | %D (Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **CCV Sample: 25-Aug-2016 08:39:30** | | | | | | | | | |
| **1,4-Dichlorobenzene** | | | | | | | | | |
| | 1.622200 | 20.00 | 846833 | 15 | 1016764 | **1.600889** | **1.600889** ***Match*** | **-1.3** | **-1.3** ***Match*** |

%D Percent Difference = 100% × ( RF – Mean RF [ICAL] ) / ( Mean RF [ICAL] )
RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )

### QC Element: Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD)

| Analyte | LCS Spike Added | LCS Result | %Rec (Reported) | %Rec (Calc) | Note |
|---|---|---|---|---|---|
| Anthracene | 10 | 7.8 | **78** | **78** ***Match*** | ok (55 - 110) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH18018 | Date: 11/20/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

MS/MSD Sample ID = RH18018-001

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Phenol | 13.325 | 23 | 26.26 | **57** | **56** ***~ Match*** | ok (0 - 115) |

RH18018-001MS

| Spike Added | MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|---|
| 25 | 28.591 | **61** | **61** ***Match*** | ok (0 - 115) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **8.5** | **8** ***Match*** | ok (< 30) |

**Recalculation of Sample Results:**

IS Internal Standard: Acenaphthene-d10

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Dilution | Extracted Volume (mL) | Final Volume (µL) | Response (pdf-pg) | Conc. (Reported) (µg/L) | Conc. (Calc'd) (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| **Lab Sample ID: RH18018-003 (CDL-DTW1-00-119128)** | | | | | | | | | |
| Acenaphthene | 1.363480 | 20.00 | 1439280 | 1 | 1000 | 1000 | 20891 | **0.21** | **0.21291** ***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS]) × Final Vol / (Extracted Vol × Injected Vol)

Injected Vol = 1 µL

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q3 |
| SDG: | 9711_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | James Parker, Senior Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-DTW1-00-119128 | 9711006 | Water | Field Sample/N | X |
| CDL-DTW1-01-119128 | 9711007 | Water | Field Sample/N | X |
| CDL-DTW2-00-107116 | 9711001 | Water | Field Sample/N | X |
| CDL-DTW3-00-97106 | 9711004 | Water | Field Sample/N | X |
| CDL-DTW4-00-101110 | 9711005 | Water | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 9711_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

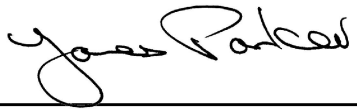
- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (1.18%) out of the 85 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

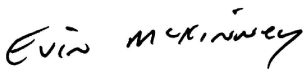
| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | The laboratory noted that MS/MSD recoveries were outside control limits. |



November 20, 2017

Reviewed by James Parker, Senior Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-107116 (MS)/ 9711002 | Octachlorodibenzo -p-dioxin | 67.70 | 101 - 151 | 10 - 151 | percent | J/UJ | M | |
| CDL-DTW2-00-107116 (SD)/ 9711003 | Octachlorodibenzo -p-dioxin | 93.90 | 101 - 151 | 10 - 151 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-DTW2-00-107116 | N | Octachlorodibenzo-p-dioxin | 109 | 1470 | 1470 J | - | pg/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: E1613 Extraction Method: SW3520C | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-DTW2-00-107116 | N | Octachlorodibenzo-p-dioxin | 109 | 1470 | 1470 J | - | pg/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| M | MS Recovery |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. The laboratory noted that 1,2,3,4,5,6,7,9-OCDF as outside control; however, it was within project acceptance limits. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted analyses that reported non-detects and positive tarrget analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | 9711 | Date: | 11/20/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were all standards analyzed at the appropriate concentrations? | **Yes** |
| Were all samples associated with an acceptable initial calibration? | **Yes** |
| Were five RRF RSD's ≤ 35%? | **Yes** |
| Were five RRF RSD's ≤ 25%? | **Yes** |
| Were the GC resolution criteria are met [Percent Valley (% Valley) ≤25% | **Yes** |
| Were recalculations performed on a representative sample of the RRFs? | **Yes** |
| Were recalculations performed on a representative sample of the %RSDs? | **Yes** |

List any samples which did not meet the specified criteria below, and describe reasons for qualification in Comment section.

**CALCULATIONS**

RRF Standard ID: CS2 UD150911-06 CS2 Calibration ID: CFA_1613_b04may16.mdb
Compound ID: 234678-$H_X$CDF Compound ID: OCDF
Reported Result: 1.106 pg. 258 %RSD: 6.57298 page 259
Average RRF = 1.32054

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%RSD = Standard Deviation / Average RRF X 100

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Compound Area = | 117000 | page 293 | RF Level 1 = | 1.223 | RF Level 6 = | 1.4560 |
| I.S. Area = | 1060000 | page 293 | RF Level 2 = | 1.253 | RF Level 7 = | |
| Compound Conc. = | 10.00 | page 258 | RF Level 3 = | 1.278 | RF Level 8 = | |
| I.S. Conc. = | 100 | | RF Level 4 = | 1.338 | RF Level 9 = | |
| | | | RF Level 5 = | 1.375 | | |

RRF = 1.104
Close Match, rounding

Standard Deviation = 0.087
Average RRF = 1.321 Matches
%RSD = 6.559 Close Match (rounding)

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | 9711 | Date: | 11/20/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were all samples associated with an acceptable continuing calibration? | **Yes** |
| Were all RRF %D values ≤ 35%? | **Yes** |
| Were recalculations performed on a representative sample of the RRFs? | **Yes** |
| Were recalculations performed on a representative sample of the %Ds? | **Yes** |

List any samples which did not meet the specified criteria below, and describe reasons for qualification in Comment section. **Include +/- notation to denote bias of %D outliers.**

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| RRF Standard ID: | b11sep16a-15 9/11/2016 21:18 | | %D Standard ID: | b11sep16a-15 9/11/2016 21:18 | |
| Compound ID: | 2378-TCDD | | Compound ID: | 123678-$H_X$CDF | |
| Reported Result: | 0.997 | page 398 | Reported %D: | 6.4% | page 398 |

CCV RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%D = Average RRF - CCV RRF / Average RRF X 100

| | | | | | |
|---|---|---|---|---|---|
| Compound Area = | 71200 | page 398 | Average RRF = | 1.115410 | page 258 |
| I.S. Area = | 714000 | page 398 | CCV RRF = | 1.187 | page 398 |
| Compound Conc. = | 10 | page 398 | | | |
| I.S. Conc. = | 100 | | %D = | -6.42 | Matches |
| CCV RRF = | 0.997 | Matches | %D Indicating Bias = | 6.4 | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | 9711 | Date: | 11/20/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

Were all surrogate recoveries within the specified criteria (65-135%)? **Yes**
Were recalculations performed on a representative sample of the results? **Yes**

List any samples which did not have acceptable surrogate recoveries.

Any non-detect result associated with a surrogate recovery below 10% should be rejected.

**CALCULATIONS**

Sample ID: CDL-DTW1-01-119128 (9711007)
Compound ID: 13C-OCDD
Reported Result: 29.2% page 30

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 1230.00 page 24
Surr. Spike Conc. = 4210.00

% Recovery = 29.2 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

| | | | |
|---|---|---|---|
| SDG #: | 9711 | Date: | 11/20/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were MS/MSD samples analyzed at the proper frequency? | **Yes** |
| Were all spike recoveries and RPD values within the established criteria? | **No** |
| Were recalculations performed on a representative sample of the results? | **Yes** |
| If no, list outliers below. (see outlier report) | |

### CALCULATIONS

| | | | |
|---|---|---|---|
| Sample ID: | CDL-DTW2-00-107116 MS | Sample ID: | CDL-DTW2-00-107116 MS/MSD |
| Compound ID: | 1,2,3,4,6,7,8,9-OCDD | Compound ID: | 1,2,3,4,6,7,8,9-OCDD |
| Recovery: | 67.7% page 33 | RPD: | 18.8 page 77 |

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

| | | | | | |
|---|---|---|---|---|---|
| Conc. MS = | 2940.00 | page 33 | MS Conc. = | 2940.00 | page 33 |
| Unspiked Samp. = | 1470.0 | page 16 | MSD Conc. = | 3550.00 | page 34 |
| MS Spike Conc. = | 2170.0 | page 33 | | | |
| | | | RPD = | 18.8 | Matches |
| % Recovery = | 67.7 | Matches | | | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | 9711 | Date: | 11/20/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were laboratory control samples analyzed at the proper frequency? | **Yes** |
| Were all spike recoveries and RPD values within the established criteria? | **Yes** |
| Were recalculations performed on a representative sample of the results? | **Yes** |
| If no, list outliers below. (see outlier report) | |

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| Sample ID: | LCS for batch 32742 | | Sample ID: | LCS/LCSD for batch 32742 | |
| Compound ID: | 2,3,7,8-TCDD | | Compound ID: | 2,3,4,6,7,8-HxCDF | |
| Recovery: | 94.5% | page 31 | RPD: | 4.57% | page 32 |
| % Recovery = | Conc. LCS / LCS Spike Conc. X 100 | | RPD = | \|LCS Conc. - LCSD Conc.\| / (LCS Conc. + LCSD Conc.)/2 X 100 | |
| Conc. LCS = | 189.00 | page 31 | LCS Conc. = | 51.55 | page 175 |
| LCS Spike Conc. = | 200.00 | | LCSD Conc. = | 49.25 | page 189 |
| % Recovery = | 94.5 | Matches | RPD = | 4.57 | Matches |

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 9711 | Date: | 11/20/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were recalculations performed on at least 10% of positive results? | **Yes** |
| Did all raw data agree with the final reported results? | **Yes** |
| Were positive hits verified by acceptable mass spectra? | **Yes** |
| Were all retention times within 0.06 RRT units of the daily standard? | **Yes** |

**CALCULATIONS**

Sample ID: CDL-DTW2-00-107116 (9711001)
Compound ID: 1,2,3,4,6,7,8,9-OCDD
Reported Result: 1470 pg/L page 16

Conc. In Sample = Area Cmpd. In Sample / Area of I.S. X Conc. of I.S. / Average RRF X Final Volume / Initial Amount X Dilution Factor

| | | Units | |
|---|---|---|---|
| Area Sample = | 95800 | Area | page 39 |
| Area I.S. = | 271000 | Area | page 39 |
| Conc. I.S. = | 100 | | |
| Average RRF = | 1.049720 | NA | page 256 |
| Final Volume = | 40.0 | uL | page 231 |
| Initial Amount = | 915.0 | ml | page 231 |
| Dilution Factor = | 1.0 | NA | page 39 |
| % Solids = | 100.0% | | |
| Conc. In Sample = | 1472 | | |
| | Match | | |

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q2 |
| SDG: | RE17027 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Amy Bass, Data Review Chemist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | December 01, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7470A | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|
| CDL-RB2-03-051316 | RE17027-008 | Water | Equipment Blank/EB | X | X | X | X |
| CDL-MW1-00-047066 | RE17027-006 | Water | Field Sample/N | X | X | X | X |
| CDL-MW2-00-029048 | RE17027-007 | Water | Field Sample/N | X | X | X | X |
| CDL-MW3-00-007026 | RE17027-005 | Water | Field Sample/N | X | X | X | X |
| CDL-MW4-00-009028 | RE17027-003 | Water | Field Sample/N | X | X | X | X |
| CDL-MW4-01-009028 | RE17027-004 | Water | Field Sample/N | X | X | X | X |
| CDL-MW5-00-009028 | RE17027-001 | Water | Field Sample/N | X | X | X | X |
| CDL-MW6-00-023042 | RE17027-002 | Water | Field Sample/N | X | X | X | X |
| CDL-TB4-03-051316 | RE17027-009 | Water | Trip Blank/TB | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RE17027. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

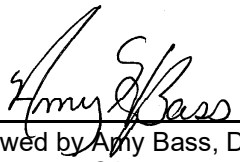
Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 11 results (0.99%) out of the 1111 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

It was noted that FedEx "Rec'd By" info missing on COC.

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | No additional comments; see Checklist for detail. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW8260B | The lab narrated the MS/MSD recoveries in batch 13975 were outside acceptance criteria. All other QA/QC criteria for the batch were within acceptance criteria and method control limits. The MS/MSD recovery results are attributed to matrix interference. The associated sample results were reported and no corrective action was required. |
| SW8270D | The lab narrated the MS/MSD recoveries in batch 13648 were outside acceptance criteria. All other QA/QC criteria for the batch were within acceptance criteria and method control limits. The MS/MSD recovery results are attributed to matrix interference. The associated sample results were reported and no corrective action was required. |



November 27, 2017

Reviewed by Amy Bass, Data Review Chemist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

December 01, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW8260B, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB2-03-051316 (EB)/ RE17027-008 | Chloromethane | 0.2300 | < 0.19 | < 1 | ug/l | U/None | V | |
| CDL-RB2-03-051316 (EB)/ RE17027-008 | Acetone | 5.900 | < 1.6 | < 20 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Equipment Blank for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW1-00-047066 | N | Chloromethane | 1.00 | 0.290 J | 1.00 U | + | ug/l | V |
| CDL-MW2-00-029048 | N | Chloromethane | 1.00 | 0.190 J | 1.00 U | + | ug/l | V |
| CDL-MW3-00-007026 | N | Chloromethane | 1.00 | 0.210 J | 1.00 U | + | ug/l | V |
| CDL-MW4-00-009028 | N | Chloromethane | 10.0 | 2.00 J | 10.0 U | + | ug/l | V |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW4-00-009028 (SD)/ RE17027-003MD | Isopropylbenzene (Cumene) | 126.8 | 75 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-MW4-00-009028 (MS)/ RE17027-003MS | 1,1,1-Trichloroethane | 136.0 | 65 - 130 | 20 - 130 | percent | J/None | M | |
| CDL-MW4-00-009028 (MS)/ RE17027-003MS | Toluene | 126.0 | 76 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-MW4-00-009028 (MS)/ RE17027-003MS | Isopropylbenzene (Cumene) | 130.8 | 75 - 125 | 20 - 125 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW4-00-009028 | N | Isopropylbenzene (Cumene) | 10.0 | 56.0 | 56.0 J | + | ug/l | M |
| CDL-MW4-00-009028 | N | Toluene | 10.0 | 670 | 670 J | + | ug/l | M |
| CDL-MW4-01-009028 | N | Isopropylbenzene (Cumene) | 10.0 | 60.0 | 60.0 J | + | ug/l | M |
| CDL-MW4-01-009028 | N | Toluene | 10.0 | 650 | 650 J | + | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB2-03-051316 (EB)/ RE17027-008 | 4-Chloro-3-methylphenol | 2.800 | < 0.26 | < 1 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 (MS)/ RE17027-005MS | n-Nitrosodiphenylamine | 48.00 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RE17027-005MD (SD)/ RE17027-005MD | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 30.89 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Isophorone | 30.89 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Acenaphthylene | 30.99 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2-Chlorophenol | 31.25 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Biphenyl (Diphenyl) | 32.06 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2,4,5-Trichlorophenol | 32.88 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2-Chloronaphthalene | 33.07 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Nitrobenzene | 33.09 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2,4,6-Trichlorophenol | 33.33 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Acetophenone | 34.07 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | n-Nitrosodi-n-propylamine | 34.59 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2,4-Dimethylphenol | 34.78 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | bis(2-Chloroethoxy) methane | 36.50 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | m,p-Cresol | 36.92 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2,4-Dichlorophenol | 37.04 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Hexachlorocyclopentadiene | 40.00 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2-Nitrophenol | 41.51 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | 2-Methylnaphthalene | 30.40 | < 30 | < 30 | rpd | J/None | D | |
| RE17027-005MD (SD)/ RE17027-005MD | Naphthalene | 30.89 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 | N | 2-Methylnaphthalene | 0.200 | 0.0800 J | 0.0800 J | | ug/l | D/TR |

**Qualified Results associated with the MS RPD for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 | N | Naphthalene | 0.200 | 0.190 J | 0.190 J | | ug/l | D/TR |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5030B | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW1-00-047066 | N | Chloromethane | 1.00 | 0.290 J | 1.00 U | + | ug/l | V |
| CDL-MW2-00-029048 | N | Chloromethane | 1.00 | 0.190 J | 1.00 U | + | ug/l | V |
| CDL-MW3-00-007026 | N | Chloromethane | 1.00 | 0.210 J | 1.00 U | + | ug/l | V |
| CDL-MW4-00-009028 | N | Isopropylbenzene (Cumene) | 10.0 | 56.0 | 56.0 J | + | ug/l | M |
| CDL-MW4-00-009028 | N | Toluene | 10.0 | 670 | 670 J | + | ug/l | M |
| CDL-MW4-00-009028 | N | Chloromethane | 10.0 | 2.00 J | 10.0 U | + | ug/l | V |
| CDL-MW4-01-009028 | N | Isopropylbenzene (Cumene) | 10.0 | 60.0 | 60.0 J | + | ug/l | M |
| CDL-MW4-01-009028 | N | Toluene | 10.0 | 650 | 650 J | + | ug/l | M |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW3-00-007026 | N | 2-Methylnaphthalene | 0.200 | 0.0800 J | 0.0800 J | | ug/l | D/TR |
| CDL-MW3-00-007026 | N | Naphthalene | 0.200 | 0.190 J | 0.190 J | | ug/l | D/TR |
| CDL-MW3-00-007026 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| D | MS RPD |
| M | MS Recovery |
| TR | Trace Level Detect |
| V | Equipment Blank |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | Analytes reported > LOD in CCB results; associated results were either ND or greater than the Action Limit. No action taken on this basis. |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | PQL anomalies noted |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | NDs were reported with LOQ > Project LOQ; DL > Project DL. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | RL anomalies noted |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | LOQ > Project LOQ. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | Sample -009 was received with a bubble >6 mm in diameter and it is assumed that a vial without bubbles were used. |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. The Lab also noted Xylenes (MS %R = 129%) as out, but that is within the QAPP QC Limits (50-150%). |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | NDs were reported with elevated PQLs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry)

| Review Questions | Yes | No | NA | Comment |
|---|---|---|---|---|
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | %D outside QC Limits (high) for 3 analytes. No action required as all samples ND for these compounds. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some NDs were reported for LOQs > Project LOQs. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH17027 Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### Recalculation of Initial Calibration (ICAL) Correlation Coefficient:

| | |
|---|---|
| **Calibration ID:** | 5/18/2016 14:16-14:38 |
| **Analyte:** | Cadmium |

| Sample Name | TRUE | Found | (S)IR * | |
|---|---|---|---|---|
| Blank | 0 | 0 | 0.00015 | 14:16 |
| CAL1 MW-6629 | 0.00500 | 0.00501 | 0.00633 | 14:20 |
| CAL2 MW-6635 | 0.10000 | 0.09746 | 0.11956 | 14:25 |
| CAL3 MW-6633 | 0.50000 | 0.49812 | 0.61030 | 14:29 |
| CAL4 MW-6621 | 1.00000 | 1.0044 | 1.23040 | 14:34 |
| | | | | 14:38 |

| | | | |
|---|---|---|---|
| **Reported Correlation:** | | **0.999972** | |
| **Calculated:** | **$R^2$ =** | **0.999979** | ***Match*** |
| | **R =** | 0.999990 | > 0.995 |

### QC Element: Initial Calibration Verificaton (ICV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Conc.<br>(Calc'd) * | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|
| **ICV1 (ICV 6631) - 5/18/2016 14:45** | | | | | | |
| Calcium | 50.0000 | **50.9840** | **50.9840**<br>***Match*** | **102** | **102**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

%R - Percent Recovered = 100% × FOUND / TRUE

* Average of 3 readings (p.724)

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH17027 Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verificaton (CCV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Conc.<br>(Calc'd) * | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|
| **CCV4 (CCV MW6622) - 5/19/2016 15:40** | | | | | | |
| Arsenic | 0.5000 | **0.5098** | **0.5098**<br>***Match*** | **102** | **102**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

%R - Percent Recovered = 100% × FOUND / TRUE * Average of 3 readings (p.1238)

### QC Element: Interference Check Sample (ICS) - A/AB

ICSA/AB MW-6607/8 5/18 14:58 / 15:03

| Analyte | TRUE<br>Conc'n | Reported<br>Result / A | %Rec / A<br>(Reported) | %Rec / A<br>(Calc'd) | Reported<br>Result / AB | %Rec / AB<br>(Reported) | %Rec / AB<br>(Calc'd) |
|---|---|---|---|---|---|---|---|
| Calcium | 500 | 475 | **95** | **95**<br>***Match*** | 486 | **97** | **97**<br>***Match*** |

%R - Percent Recovered = 100% × FOUND / TRUE

### QC Element: Laboratory Control Sample (LCS)

| Analyte | LCS Spike<br>Added | LCS Result<br>(Reported) | LCS Result<br>(Calc'd) * | %Rec<br>(Reported) | %Rec<br>(Calc'd) | Note |
|---|---|---|---|---|---|---|
| **LCS / Batch 13462 (5/18/2016 20:50) - RQ13462-002** | | | | | | |
| Potassium | 40 | **41** | **40.673**<br>***Match*** | **102** | **102**<br>***Match*** | Control Limits:<br>75 - 125 |

%R - Percent Recovered = 100% × ( Result / Spike Added ) * Average of 3 readings (p.964)

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH17027 Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Calcium | 23.451 | 40 | 65.868 | **106** | **106** *Match* | ok (75 - 125) |

MS/MSD Sample ID = RE17027-005MS / MSD

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

| MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|
| 64.434 | **102** | **102** *Match* | ok (75 - 125) |

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **2.2** | **2.2** *Match* | ok (< 30) |

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH17027 Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Serial Dilution

| Lab Sample ID<br>Analyte | Initial Result | Serial Result | %Diff (Reported) | %Diff (Calc'd) | Comment |
|---|---|---|---|---|---|
| **RE17027-005 / RE17027-005L** | **( 1× )** | **( 5× )** | | | **Control Limits: (NFG)** |
| Calcium | 23.451 | 22.397 | **4.5** | **4.5**<br>***Match*** | ≤ 10% |

Note: Calcium was the only analyte detected at >50× the MDL. * Concentration after correction for 5× dilution.

%Diff: %Difference = 100% × ABS [ Dilution Result – Initial Result ] / Initial Result

### Recalculation of Sample Results:

| Lab Sample ID<br>Analyte | Raw Conc. * | Dilution Factor | Conc. (Reported) | Conc. (Calc'd) * |
|---|---|---|---|---|
| **RE17027-006 / CDL-MW1-00-047066** | | | | |
| Iron (Dissolved) | 0.68320<br>(p.1012)* | 1<br>(p.36) | **0.68**<br>(p.36) | **0.683**<br>***Match*** |

* Average of 3 results.

Concentration = ( Raw Conc. ) × Dilution

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7470A

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water | Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### Recalculation of Initial Calibration (ICAL) Correlation Coefficient:

| | |
|---|---|
| **Date:** | 5/18/2016 15:23 - 15:32 |
| **Analyte:** | Mercury |

| Sample Name | TRUE | Found | Response |
|---|---|---|---|
| Blank | 0.000 | 0.004 | 29 |
| CAL 0.1 | 0.100 | 0.116 | 648 |
| CAL 0.2 | 0.200 | 0.209 | 1166 |
| CAL 1.0 | 1.000 | 1.004 | 5561 |
| CAL 2.0 | 2.000 | 1.949 | 10792 |
| CAL 5.0 | 5.000 | 5.018 | 27773 |

| | Reported | Calc'd | |
|---|---|---|---|
| $R^2$ | NA | 0.999823 | |
| Correlation (R) | 0.9999116 | 0.9999116 | ***Match*** |
| Slope (B) | 1.807E-04 | 1.807E-04 | ***Match*** |
| Intercept (C) | -1.3972E-03 | -1.3972E-03 | ***Match*** |

### QC Element: Initial Calibration Verificaton (ICV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **ICV1 - 5/18/2016 15:34** | | | | | | | |
| Mercury | 0.002000 | **0.002042** | 11308 | **0.002042**<br>***Match*** | **102** | **102**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × FOUND / TRUE

| | |
|---|---|
| B: | 1.807E-04 |
| C: | -1.3972E-03 |

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7470A

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water | Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verificaton (CCV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **CCV3 -5/18/2016 16:51** | | | | | | | |
| Mercury | 0.002000 | **0.001798** | 9955 | **0.001797**<br>***Match*** | **90** | **90**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × FOUND / TRUE

B: 1.807E-04
C: -1.3972E-03

### QC Element: Laboratory Control Sample (LCS)

| Analyte | Dilution<br>Factor | LCS Spike<br>Added | LCS Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %Rec<br>(Reported) | %Rec<br>(Calc'd) | Note |
|---|---|---|---|---|---|---|---|---|
| **LCS / RQ13403-002 (5/18/2016 17:18) - Batch 13403** | | | | | | | | |
| Mercury | 1 | 0.0020 | **0.0021** | 11752 | **0.0021**<br>***Match*** | **106** | **106**<br>***Match*** | Control Limits:<br>75 - 125 |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × ( Result / Spike )

B: 1.807E-04
C: -1.3972E-03

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7470A

SDG #: RH17027 Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| **MS/MSD – RE17027-005MS / MSD (5/18/2016 17:34 / 17:40) – Batch 13403** | | | | | | |
| Mercury (Dissolved) | ND (0) | 0.0020 | 0.0022316 | **112** | **112** ***Match*** | ok (75 - 125) |
| | | | **MSD Result** | **MSD %Rec (Reported)** | **MSD %Rec (Calc)** | **Note** |
| | | | 0.0021096 | **105** | **105** ***Match*** | ok (75 - 125) |
| | | | | **RPD (Reported)** | **RPD (Calc)** | **Note** |
| | | | | **5.6** | **5.6** ***Match*** | ok (< 30) |

%Rec = Percent Recovery
= 100% × ( Result / Spike Added )

RPD = Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7470A

SDG #: RH17027 Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**Recalculation of Sample Results:**

| Lab Sample ID<br>Analyte | Instrument Response | Dilution Factor | Raw Conc'n | Conc. (Reported) | Conc. (Calc'd) | |
|---|---|---|---|---|---|---|
| **RE17027-004 / CDL-MW4-01-009028 (5/18/2016 17:31)** | | | | | | |
| Mercury | 36 | 1 | 0.0051 (calc'd) | **0.00010 U** | **0.0000051** ***Match*** | * |

Raw Conc. = ( Response × B ) + C

B: 1.807E-04
C: -1.397E-03

Concentration = ( Raw Conc. ) × ( 0.001 mg/µg ) × Dilution

* The calculated concentration is below the DL; therefore, the result was reported as non-detect.

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8260B

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**Recalculation of Initial Calibration (ICAL) RFs, Mean RF, RSD:**

IS Internal Standard: Chlorobenzene-d5

| Analyte | | Lvl#1 | Lvl#2 | Lvl#3 | Lvl#4 | Lvl#5 | Lvl#6 | Lvl#7 | Lvl#8 | Lvl#9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Toluene** | | | | | | | | | | |
| | **Conc. [STD]:** | 0.5 | 1 | 5 | 20 | 50 | 100 | 200 | | |
| | **Response:** | 3920 | 6297 | 36866 | 162840 | 419884 | 916883 | 1905824 | | |
| | **Conc. [IS]:** | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | | |
| | **Response [IS]:** | 493088 | 494740 | 493790 | 524813 | 532606 | 569596 | 587181 | | |
| | **Reported RF:** | **0.794990** | **0.636395** | **0.746593** | **0.775705** | **0.788358** | **0.804854** | **0.811430** | | |
| ***Match*** | **Calc'd RF:** | **0.794990** | **0.636395** | **0.746593** | **0.775705** | **0.788358** | **0.804854** | **0.811430** | | |

| | | Mean RF | RF RSD | Note |
|---|---|---|---|---|
| | **Reported:** | **0.765475** | **7.9** | |
| | **Calc'd:** | **0.765475** | **7.9** | ***Match*** |

RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )
RSD Relative Sandard Deviation = 100% × STDev(RF) / (Mean RF)

**QC Element: Initial Calibration Verificaton (ICV)**

IS Internal Standard: Pentafluorobenzene

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Mean RF<br>[ICAL] | Response<br>(Analyte) | Conc.<br>[IS] | Response<br>[IS] | Conc.<br>(Reported) | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **ICV Sample: 11-May-2016 14:26** | | | | | | | | | |
| Acetone | 100 | 0.479644 | 275298 | 50.000 | 316074 | **90.796** | **90.796**<br>***Match*** | **90.8** | **90.8**<br>***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS])

%R Percent Recovered = 100% × FOUND / TRUE

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8260B

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verification (CCV)

IS Internal Standard: Chlorobenzene-d5

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Conc. [STD] | Response (Analyte) | RF (Reported) | RF (Calc'd) | %D (Reported) | %D (Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **CCV Sample: 24-May-2016 08:45** | | | | | | | | | |
| **Tetrachloroethene** | | | | | | | | | |
| | 0.200358 | 50.00 | 515807 | 50 | 113977 | **0.220968** | **0.220968** ***Match*** | **10.3** | **10.3** ***Match*** |

%D Percent Difference = 100% × ( RF – Mean RF [ICAL] ) / ( Mean RF [ICAL] )
RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )

### QC Element: Laboratory Control Sample (LCS)

| Analyte | LCS Spike Added | LCS Result | %Rec (Reported) | %Rec (Calc) | Note |
|---|---|---|---|---|---|
| Ethylbenzene | 50 | 53 | **106** | **106** ***Match*** | ok (75 - 125) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8260B

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

MS/MSD Sample ID = RE17027-003

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Toluene | 670.29 | 500 | 1256.24 | **117** | **117** ***Match*** | ok (75 - 120) |

| MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|
| 1210.10 | **108** | **108** ***Match*** | ok (75 - 120) |

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **3.7** | **3.7** ***Match*** | ok (< 30) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

**Recalculation of Sample Results:**

IS Internal Standard: Pentafluorobenzene

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Dilution Factor | Response (Analyte) | Conc. (Reported) (µg/L) | Conc. (Calc'd) (µg/L) |
|---|---|---|---|---|---|---|---|
| **Lab Sample ID: RH24026-003 (CDL-MW4-00-009028)** | | | | | | | |
| Cyclohexane | 0.665801 | 50.00 | 252211 | 10 | 61474 | **180** | **183** ***Match*** |

Conc. (µg/L) = Dilution × ( Response × Conc. [IS] ) / ( Response [IS] × Mean RF [ICAL] )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**Recalculation of Initial Calibration (ICAL) RFs, Mean RF, RSD:**

IS Internal Std: 1,4-Dichlorobenzene-d4

| Analyte | | Lvl#1 | Lvl#2 | Lvl#3 | Lvl#4 | Lvl#5 | Lvl#6 | Lvl#7 | Lvl#8 | Lvl#9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Aniline** | | **ICAL - 5/13/2016** | | | | | | | | |
| | **Conc.: [STD]** | | 1 | 2 | 5 | 10 | 15 | 20 | 25 | 30 |
| | **Response:** | | 54122 | 112582 | 295252 | 564564 | 814982 | 1157537 | 1274767 | 1608021 |
| | **Conc. [IS]:** | | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| | **Response [IS]:** | | 1035116 | 1040737 | 1098814 | 1086007 | 1072805 | 1160135 | 1062482 | 1161849 |
| | **Reported RF:** | | **1.045719** | **1.081753** | **1.074802** | **1.039706** | **1.012899** | **0.997761** | **0.959841** | **0.922679** |
| ***Match*** | **Calc'd RF:** | | **1.045719** | **1.081753** | **1.074802** | **1.039706** | **1.012899** | **0.997761** | **0.959841** | **0.922679** |

| | | Mean RF | RF RSD | Note |
|---|---|---|---|---|
| | **Reported:** | **1.016895** | **5.4** | |
| | **Calc'd:** | **1.016895** | **5.4** | ***Match*** |

RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )
RSD Relative Sandard Deviation = 100% × STDev(RF) / (Mean RF)

**QC Element: Initial Calibration Verificaton (ICV)**

IS Internal Standard: Naphthalene-d8

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Mean RF<br>[ICAL] | Response<br>(Analyte) | Conc.<br>[IS] | Response<br>[IS] | Conc.<br>(Reported) | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ICV: ICV1FV 01-Sep-2016 15:01:30** | | | | | | | | | |
| Naphthalene | 25 | 1.199744 | 1757547 | 20.000 | 5351139 | **27.376** | **27.376**<br>***Match*** | **104.5** | **109.5**<br>***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS]) × Final Vol / (Extracted Vol × Injected Vol)
%R Percent Recovered = 100% × FOUND / TRUE Final Vol = 5000 µL Extracted Vol = 1000 mL Injected Vol = 1 µL

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verification (CCV)

IS Internal Standard: Acenaphthene-d10

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Conc. [STD] | Response (Analyte) | RF (Reported) | RF (Calc'd) | %D (Reported) | %D (Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **CCV Sample: 01-Sep-2016 20:50:30** | | | | | | | | | |
| Dibenzofuran | 2.048555 | 20.00 | 2537807 | 5 | 1373299 | **2.164544** | **2.164544** *Match* | **5.7** | **5.7** *Match* |

%D Percent Difference = 100% × ( RF – Mean RF [ICAL] ) / ( Mean RF [ICAL] )
RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )

### QC Element: Laboratory Control Sample (LCS)

| Analyte | LCS Spike Added | LCS Result | %Rec (Reported) | %Rec (Calc) | Note |
|---|---|---|---|---|---|
| Pyrene | 10 | 9.6 | **96** | **96** *Match* | ok (50 - 130) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH17027 | Date: 11/30/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

MS/MSD Sample ID = RE17027-005

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Naphthalene | 0.19 | 10 | 5.2 | **50** | **50** *Match* | ok (40 - 110) |

RH24026-021MS/MSD

| | Spike Added | MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|---|---|
| | 10 | 7.1 | **69** | **69** *Match* | ok (40 - 110) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **31** | **31** *Match* | > (< 30) |

**Recalculation of Sample Results:**

IS Internal Standard: Acenaphthene-d10 | Calib: 9/1/2016 6:22 PM

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Dilution | Extracted Volume (mL) | Final Volume (µL) | Response (Analyte) | Conc. (Reported) (µg/L) | Conc. (Calc'd) (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| **Lab Sample ID: RE17027-003 (CDL-MW4-00-009028)** | | | | | | | | | |
| Acenaphthene | 1.367777 | 20.00 | 2486080 | 1 | 1000 | 1000 | 54878 | **0.32** | **0.32** *Match* |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS]) × Final Vol / (Extracted Vol × Injected Vol)

Injected Vol = 1 µL

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q2 |
| SDG: | 9224_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RB2-03-051316 | 9224007 | Water | Equipment Blank/EB | X |
| CDL-MW3-00-007026 | 9224004 | Water | Field Sample/N | X |
| CDL-MW4-00-009028 | 9224002 | Water | Field Sample/N | X |
| CDL-MW4-01-009028 | 9224003 | Water | Field Sample/N | X |
| CDL-MW5-00-009028 | 9224001 | Water | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 9224_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 6 results (7.06%) out of the 85 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | No additional comments; see Checklist for detail. |

November 18, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12016133 (BS)/ 12016133 | 2,3,7,8-Tetrachlorodibenzofuran | 94.50 | 95 - 126 | 10 - 126 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 | N | 2,3,7,8-Tetrachlorodibenzofuran | 11.0 | 7.34 U | 7.34 UJ | - | pg/l | C |
| CDL-MW4-00-009028 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.8 | 7.18 U | 7.18 UJ | - | pg/l | C |
| CDL-MW4-01-009028 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.5 | 7.02 U | 7.02 UJ | - | pg/l | C |
| CDL-MW5-00-009028 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.6 | 7.04 U | 7.04 UJ | - | pg/l | C |
| CDL-RB2-03-051316 | EB | 2,3,7,8-Tetrachlorodibenzofuran | 10.6 | 7.07 U | 7.07 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method E1613, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 (SD)/ 9224006 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 87.89 | 88 - 135 | 10 - 135 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 11.0 | 7.34 U | 7.34 UJ | - | pg/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

**Test Method: E1613 Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW3-00-007026 | N | 2,3,7,8-Tetrachlorodibenzofuran | 11.0 | 7.34 U | 7.34 UJ | - | pg/l | C |
| CDL-MW3-00-007026 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 11.0 | 7.34 U | 7.34 UJ | - | pg/l | M |
| CDL-MW4-00-009028 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.8 | 7.18 U | 7.18 UJ | - | pg/l | C |
| CDL-MW4-01-009028 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.5 | 7.02 U | 7.02 UJ | - | pg/l | C |
| CDL-MW5-00-009028 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.6 | 7.04 U | 7.04 UJ | - | pg/l | C |
| CDL-RB2-03-051316 | EB | 2,3,7,8-Tetrachlorodibenzofuran | 10.6 | 7.07 U | 7.07 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| M | MS Recovery |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 9224
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b04may16b-3
Compound ID: 2378-TCDD
Reported Result: 1.0350

Calibration ID: b04may16b
Compound ID: 2378-TCDD
%RSD: 2.40113%
Average RRF = 1.01656

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%RSD = Standard Deviation / Average RRF X 100

Compound Area = 2540
I.S. Area = 983000
Compound Conc. = 0.3
I.S. Conc. = 100

RRF = 1.0336
Matches

RF Level 1 = 1.035
RF Level 2 = 1.040
RF Level 3 = 0.989
RF Level 4 = 0.988
RF Level 5 = 1.038
RF Level 6 = 1.008
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.024
Average RRF = 1.016 Matches
%RSD = 2.41 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: 9224
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b03jun16c_2-14
Compound ID: 2378-TCDD
Reported Result: 0.946

Standard ID: b03jun16c_2-14
Compound ID: 2378-TCDD
Reported %D: -6.9%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{(\text{CCV RRF} - \text{IC RRF})}{\text{IC RRF}} \times 100$$

Compound Area = 38000
I.S. Area = 401000
Compound Conc. = 10
I.S. Conc. = 100

IC RRF = 1.017
CCV RRF = 0.946
%D = -6.98 Matches

CCV RRF = 0.948 Matches

%D Indicating Bias = 7.0

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: 9224
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 9224001
Compound ID: 13C-2,3,7,8-TCDD
Reported Result: 70.0%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 1480
Surr. Spike Conc. = 2120

% Recovery = 69.8 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: 9224
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | 9224005 | Sample ID: | 9224005/9224006 |
| Compound ID: | 2378-TCDD | Compound ID: | 2378-TCDD |
| Recovery: | 90.4 | RPD: | 2.360 |

% Recovery = (Conc. MS - Conc. Unspiked Sample) / MS Spike Conc. X 100

RPD = |MS Conc. - MSD Conc.| / (MS Conc. + MSD Conc.)/2 X 100

Conc. MS = 201
Unspiked Samp. = 0
MS Spike Conc. = 223

% Recovery = 90.1 Matches

MS Conc. = 201
MSD Conc. = 196

RPD = 2.519 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 9224
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/18/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 12016133
Compound ID: 2378-TCDD
Recovery: 89.0%

Sample ID: 12016133/12016134
Compound ID: 2378-TCDD
RPD: 0.180

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 178
LCS Spike Conc. = 200

LCS Conc. = 178
LCSD Conc. = 178

% Recovery = 89.0 Matches

RPD = 0.00 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 9224 | Date: | 11/18/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: 9224001
Compound ID: OCDD
Reported Result: 312 pg/L

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor / Area IS X RF X Initial Volume

| | | Units |
|---|---|---|
| Area Sample = | 29900 | Area |
| Area I.S. = | 387000 | Area |
| Conc. I.S. = | 100 | |
| Average RRF = | 1.0166 | |
| Final Volume = | 0.040 | mL |
| Initial Amount = | 0.9455 | L |
| Dilution Factor = | 1.0 | NA |

Conc. In Sample = 0.322
Close Match

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q4 |
| SDG: | RK17021 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Gretchen Gotlieb, Data Review Chemist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | November 29, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7470A | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|
| CDL-RB1-02-111516 | RK17021-003 | Water | Equipment Blank/EB | X | X | X | X |
| CDL-MW1-00-047066-02 | RK17021-007 | Water | Field Sample/N | X | X | X | X |
| CDL-MW2-00-029048-02 | RK17021-012 | Water | Field Sample/N | X | X | X | X |
| CDL-MW3-00-007026-02 | RK17021-010 | Water | Field Sample/N | X | X | X | X |
| CDL-MW3-01-007026-02 | RK17021-011 | Water | Field Sample/N | X | X | | X |
| CDL-MW4-00-009028-02 | RK17021-005 | Water | Field Sample/N | X | X | X | X |
| CDL-MW4-01-009028-02 | RK17021-006 | Water | Field Sample/N | X | X | X | X |
| CDL-MW5-00-009028-02 | RK17021-004 | Water | Field Sample/N | X | X | X | X |
| CDL-MW6-00-023042-02 | RK17021-009 | Water | Field Sample/N | X | X | X | X |
| CDL-PWTOC06-00-309450 | RK17021-001 | Water | Field Sample/N | | | X | |
| CDL-PWTOC06-01-309450 | RK17021-002 | Water | Field Sample/N | | | X | |
| CDL-TB1-03-111516 | RK17021-008 | Water | Trip Blank/TB | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RK17021. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

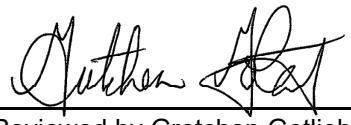
- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 278 results (21.53%) out of the 1291 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The lab noted MS/MSD recoveries in batch 27186 were outside acceptance criteria. All other QC criteria for the batch was within acceptance criteria and method control limits. The MS/MSD recovery results are attributed to matrix interference. The associated sample results were reported and no corrective action was required. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW8260B | No additional comments; see Checklist for detail. |
| SW8270D | The lab noted the following:<br><br>The LCS associated with all samples had several compounds recovery below acceptance criteria. The associated CCV had high recovery for Isophorone (21%), with no detections in the samples.<br><br>The MSD for -009 was not spiked.<br><br>Surrogate failures were present in samples -003, 004 and 012. All samples were re-extracted outside the holding time, the associated LCS passed recovery for all analytes. Samples -004 failed surrogate recovery confirming matrix interference. |



November 13, 2017

Reviewed by Gretchen Gotlieb, Data Review Chemist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

December 04, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Total, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02-111516 (EB)/ RK17021-003 | Chromium | 0.001400 | < 0.00072 | < 0.01 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Equipment Blank for SW6010C, Total**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW1-00-047066-02 | N | Chromium | 0.0100 | 0.00210 J | 0.0100 U | + | mg/l | V |
| CDL-MW3-00-007026-02 | N | Chromium | 0.0100 | 0.00800 J | 0.0100 U | + | mg/l | V |
| CDL-MW6-00-023042-02 | N | Chromium | 0.0100 | 0.00860 J | 0.0100 U | + | mg/l | V |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76.00 | 78 - 150 | 20 - 150 | percent | J/UJ | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 1,1,2-Trichloro-1,2,2-trifluoroethane | 76.00 | 78 - 150 | 20 - 150 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1.00 | 0.800 U | 0.800 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ27430-002 (BS)/ RQ27430-002 | Hexachlorocyclopentadiene | 17.20 | 20 - 123 | 20 - 123 | percent | J/UJ | C | |
| RQ27430-002 (BS)/ RQ27430-002 | Di-n-octyl phthalate | 23.00 | 35 - 135 | 35 - 135 | percent | J/UJ | C | |
| RQ27430-002 (BS)/ RQ27430-002 | bis(2-Ethylhexyl) phthalate | 25.00 | 40 - 125 | 40 - 125 | percent | J/UJ | C | |
| RQ27430-002 (BS)/ RQ27430-002 | Benzo(a)pyrene | 50.00 | 55 - 110 | 55 - 110 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW1-00-047066-02 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-MW1-00-047066-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW1-00-047066-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW1-00-047066-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | C |
| CDL-MW2-00-029048-02 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-MW3-00-007026-02 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-MW3-00-007026-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-00-007026-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-00-007026-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | Benzo(a)pyrene | 2.00 | 1.60 L U | 1.60 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | bis(2-Ethylhexyl) phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | Di-n-octyl phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | Hexachlorocyclopentadiene | 50.0 | 32.0 U | 32.0 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | Benzo(a)pyrene | 2.00 | 1.60 L U | 1.60 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | bis(2-Ethylhexyl) phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | Di-n-octyl phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | Hexachlorocyclopentadiene | 50.0 | 32.0 U | 32.0 UJ | - | ug/l | C |
| CDL-MW5-00-009028-02 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW5-00-009028-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-MW6-00-023042-02 | N | Benzo(a)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 LS U | 4.00 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 LS U | 4.00 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | C/M |
| CDL-RB1-02-111516 | EB | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,4-Dinitrophenol | 0.000 | 14 - 140 | 10 - 140 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 4-Chloroaniline | 0.000 | 15 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Atrazine | 0.000 | 20 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzaldehyde | 0.000 | 20 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Caprolactam | 0.000 | 20 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 3,3'-Dichlorobenzidine | 0.000 | 20 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,4-Dinitrotoluene | 0.000 | 20 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Hexachlorocyclopentadiene | 0.000 | 20 - 123 | 10 - 123 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 3-Nitroaniline | 0.000 | 20 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Hexachlorobutadiene | 0.000 | 25 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Dimethyl phthalate | 0.000 | 25 - 125 | 10 - 125 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,4-Dimethylphenol | 0.000 | 30 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | m,p-Cresol | 0.000 | 30 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Hexachloroethane | 0.000 | 30 - 95 | 10 - 95 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2-Chlorophenol | 0.000 | 35 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 0.000 | 35 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 4-Nitroaniline | 0.000 | 35 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | n-Nitrosodi-n-propylamine | 0.000 | 35 - 130 | 10 - 130 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Di-n-octyl phthalate | 0.000 | 35 - 135 | 10 - 135 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Acetophenone | 0.000 | 39 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2-Methylphenol (o-Cresol) | 0.000 | 40 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Naphthalene | 0.000 | 40 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2-Nitrophenol | 0.000 | 40 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Pentachlorophenol | 0.000 | 40 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2-Chloronaphthalene | 0.000 | 40 - 116 | 10 - 116 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Diethyl phthalate | 0.000 | 40 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | bis(2-Ethylhexyl) phthalate | 0.000 | 40 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzo (g,h,i)perylene | 0.000 | 40 - 125 | 10 - 125 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Dibenz (a,h)anthracene | 0.000 | 40 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 4,6-Dinitro-2-methylphenol | 0.000 | 40 - 130 | 10 - 130 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | bis(2-Chloroethoxy) methane | 0.000 | 45 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2-Methylnaphthalene | 0.000 | 45 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Acenaphthene | 0.000 | 45 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Nitrobenzene | 0.000 | 45 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzyl butyl phthalate | 0.000 | 45 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzo (a)anthracene | 0.000 | 45 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzo (b)fluoranthene | 0.000 | 45 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzo (k)fluoranthene | 0.000 | 45 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Indeno(1,2,3-c,d)pyrene | 0.000 | 45 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Biphenyl (Diphenyl) | 0.000 | 49 - 109 | 10 - 109 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Acenaphthylene | 0.000 | 50 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,4-Dichlorophenol | 0.000 | 50 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 4-Chloro-3-methylphenol | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 4-Chlorophenyl phenyl ether | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Fluorene | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Hexachlorobenzene | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Isophorone | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | n-Nitrosodiphenylamine | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,4,5-Trichlorophenol | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 4-Bromophenyl phenyl ether | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Carbazole | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,6-Dinitrotoluene | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2-Nitroaniline | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Phenanthrene | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | 2,4,6-Trichlorophenol | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Pyrene | 0.000 | 50 - 130 | 10 - 130 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Anthracene | 0.000 | 55 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Benzo(a)pyrene | 0.000 | 55 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Chrysene | 0.000 | 55 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Di-n-butyl phthalate | 0.000 | 55 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Fluoranthene | 0.000 | 55 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (SD)/ RK17021-009MD | Dibenzofuran | 0.000 | 55 - 150 | 10 - 150 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,4-Dinitrophenol | 0.000 | 14 - 140 | 10 - 140 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 4-Chloroaniline | 0.000 | 15 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Atrazine | 0.000 | 20 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzaldehyde | 0.000 | 20 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Caprolactam | 0.000 | 20 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 3,3'-Dichlorobenzidine | 0.000 | 20 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,4-Dinitrotoluene | 0.000 | 20 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Hexachlorocyclopentadiene | 0.000 | 20 - 123 | 10 - 123 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 3-Nitroaniline | 0.000 | 20 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Hexachlorobutadiene | 0.000 | 25 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Dimethyl phthalate | 0.000 | 25 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,4-Dimethylphenol | 0.000 | 30 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | m,p-Cresol | 0.000 | 30 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Hexachloroethane | 0.000 | 30 - 95 | 10 - 95 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2-Chlorophenol | 0.000 | 35 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 0.000 | 35 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 4-Nitroaniline | 0.000 | 35 - 120 | 10 - 120 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | n-Nitrosodi-n-propylamine | 0.000 | 35 - 130 | 10 - 130 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Di-n-octyl phthalate | 0.000 | 35 - 135 | 10 - 135 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Acetophenone | 0.000 | 39 - 100 | 10 - 100 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2-Methylphenol (o-Cresol) | 0.000 | 40 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Naphthalene | 0.000 | 40 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2-Nitrophenol | 0.000 | 40 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Pentachlorophenol | 0.000 | 40 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2-Chloronaphthalene | 0.000 | 40 - 116 | 10 - 116 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Diethyl phthalate | 0.000 | 40 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | bis(2-Ethylhexyl) phthalate | 0.000 | 40 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzo (g,h,i)perylene | 0.000 | 40 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Dibenz (a,h)anthracene | 0.000 | 40 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 4,6-Dinitro-2-methylphenol | 0.000 | 40 - 130 | 10 - 130 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | bis(2-Chloroethoxy) methane | 0.000 | 45 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2-Methylnaphthalene | 0.000 | 45 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Acenaphthene | 0.000 | 45 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Nitrobenzene | 0.000 | 45 - 110 | 10 - 110 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzyl butyl phthalate | 0.000 | 45 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzo (a)anthracene | 0.000 | 45 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzo (b)fluoranthene | 0.000 | 45 - 120 | 10 - 120 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzo (k)fluoranthene | 0.000 | 45 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Indeno(1,2,3-c,d)pyrene | 0.000 | 45 - 125 | 10 - 125 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Biphenyl (Diphenyl) | 0.000 | 49 - 109 | 10 - 109 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Acenaphthylene | 0.000 | 50 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,4-Dichlorophenol | 0.000 | 50 - 105 | 10 - 105 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 4-Chloro-3-methylphenol | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 4-Chlorophenyl phenyl ether | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Fluorene | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Hexachlorobenzene | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Isophorone | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | n-Nitrosodiphenylamine | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,4,5-Trichlorophenol | 0.000 | 50 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 4-Bromophenyl phenyl ether | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Carbazole | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,6-Dinitrotoluene | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2-Nitroaniline | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Phenanthrene | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | 2,4,6-Trichlorophenol | 0.000 | 50 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Pyrene | 0.000 | 50 - 130 | 10 - 130 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Anthracene | 0.000 | 55 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Benzo(a)pyrene | 0.000 | 55 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Chrysene | 0.000 | 55 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Di-n-butyl phthalate | 0.000 | 55 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Fluoranthene | 0.000 | 55 - 115 | 10 - 115 | percent | J/R | M | |
| CDL-MW6-00-023042-02 (MS)/ RK17021-009MS | Dibenzofuran | 0.000 | 55 - 150 | 10 - 150 | percent | J/R | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dimethylphenol | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dinitrophenol | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 S U | 1.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 S U | 1.00 UJ | - | ug/l | M |

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 | N | 2-Chloronaphthalene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Chlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Methylnaphthalene | 0.200 | 0.100 S U | 0.100 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Nitrophenol | 2.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 3-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Chloroaniline | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Acenaphthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Acenaphthylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Acetophenone | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Atrazine | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzaldehyde | 5.00 | 2.00 S U | 2.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(a)anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(a)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Benzo(b)fluoranthene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(k)fluoranthene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzyl butyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 LS U | 4.00 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Caprolactam | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Carbazole | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Chrysene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Dibenzofuran | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Diethyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Dimethyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Di-n-butyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 LS U | 4.00 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Fluoranthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Fluorene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 | N | Hexachlorobenzene | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Hexachlorobutadiene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Hexachloroethane | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Isophorone | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | m,p-Cresol | 2.00 | 2.00 S U | 2.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Naphthalene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Nitrobenzene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Pentachlorophenol | 2.00 | 1.50 S U | 1.50 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Phenanthrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-MW2-00-029048-02 (N)/ RK17021-012 | Terphenyl-d14 | 44.81 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-MW5-00-009028-02 (N)/ RK17021-004 | Terphenyl-d14 | 27.46 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-RB1-02-111516 (EB)/ RK17021-003 | 2-Fluorobiphenyl | 38.32 | 44 - 119 | 10 - 119 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW2-00-029048-02 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW2-00-029048-02 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Benzo(b)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW2-00-029048-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Acenaphthene | 0.200 | 0.0920 JQ | 0.0920 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Anthracene | 0.200 | 0.0690 JQ | 0.0690 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW5-00-009028-02 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Benzo(b)fluoranthene | 0.200 | 0.200 QL | 0.200 J | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzo(g,h,i)perylene | 0.200 | 0.0470 JQ | 0.0470 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Chrysene | 0.200 | 0.0680 JQ | 0.0680 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Fluoranthene | 0.200 | 0.240 Q | 0.240 J | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Naphthalene | 0.200 | 0.0630 JQ | 0.0630 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Phenanthrene | 0.200 | 0.170 JQ | 0.170 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Pyrene | 0.200 | 0.190 JQ | 0.190 J | - | ug/l | I/TR |
| CDL-RB1-02-111516 | EB | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02-111516 | EB | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Benzo(b)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(k)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-RB1-02-111516 | EB | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: Total | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW1-00-047066-02 | N | Chromium | 0.0100 | 0.00210 J | 0.0100 U | + | mg/l | V |
| CDL-MW3-00-007026-02 | N | Chromium | 0.0100 | 0.00800 J | 0.0100 U | + | mg/l | V |
| CDL-MW6-00-023042-02 | N | Chromium | 0.0100 | 0.00860 J | 0.0100 U | + | mg/l | V |

| Test Method: SW8260B | Extraction Method: SW5030B | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW6-00-023042-02 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1.00 | 0.800 U | 0.800 UJ | - | ug/l | M |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW1-00-047066-02 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-MW1-00-047066-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW1-00-047066-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW1-00-047066-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | C |
| CDL-MW2-00-029048-02 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW2-00-029048-02 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Benzo(b)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW2-00-029048-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW2-00-029048-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-MW3-00-007026-02 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-MW3-00-007026-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-00-007026-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW3-00-007026-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | Benzo(a)pyrene | 0.200 | 0.160 L U | 0.160 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 L U | 4.00 UJ | - | ug/l | C |
| CDL-MW3-01-007026-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | Benzo(a)pyrene | 2.00 | 1.60 L U | 1.60 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | bis(2-Ethylhexyl) phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | Di-n-octyl phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-00-009028-02 | N | Hexachlorocyclopentadiene | 50.0 | 32.0 U | 32.0 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | Benzo(a)pyrene | 2.00 | 1.60 L U | 1.60 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | bis(2-Ethylhexyl) phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | Di-n-octyl phthalate | 50.0 | 40.0 L U | 40.0 UJ | - | ug/l | C |
| CDL-MW4-01-009028-02 | N | Hexachlorocyclopentadiene | 50.0 | 32.0 U | 32.0 UJ | - | ug/l | C |
| CDL-MW5-00-009028-02 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Acenaphthene | 0.200 | 0.0920 JQ | 0.0920 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Anthracene | 0.200 | 0.0690 JQ | 0.0690 J | - | ug/l | I/TR |

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**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW5-00-009028-02 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Benzo(b)fluoranthene | 0.200 | 0.200 QL | 0.200 J | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzo(g,h,i)perylene | 0.200 | 0.0470 JQ | 0.0470 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Chrysene | 0.200 | 0.0680 JQ | 0.0680 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Fluoranthene | 0.200 | 0.240 Q | 0.240 J | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Naphthalene | 0.200 | 0.0630 JQ | 0.0630 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Phenanthrene | 0.200 | 0.170 JQ | 0.170 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-MW5-00-009028-02 | N | Pyrene | 0.200 | 0.190 JQ | 0.190 J | - | ug/l | I/TR |
| CDL-MW5-00-009028-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-MW5-00-009028-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |
| CDL-MW6-00-023042-02 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW6-00-023042-02 | N | 2,4-Dimethylphenol | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dinitrophenol | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 S U | 1.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 S U | 1.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Chloronaphthalene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Chlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Methylnaphthalene | 0.200 | 0.100 S U | 0.100 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 2-Nitrophenol | 2.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 S U | 2.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 3-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Chloroaniline | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | 4-Nitroaniline | 2.00 | 1.60 S U | 1.60 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Acenaphthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Acenaphthylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Acetophenone | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Atrazine | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzaldehyde | 5.00 | 2.00 S U | 2.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(a)anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(a)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Benzo(b)fluoranthene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzo(k)fluoranthene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Benzyl butyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 LS U | 4.00 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Caprolactam | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Carbazole | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Chrysene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Dibenzofuran | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Diethyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-MW6-00-023042-02 | N | Dimethyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Di-n-butyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Di-n-octyl phthalate | 5.00 | 4.00 LS U | 4.00 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Fluoranthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Fluorene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Hexachlorobenzene | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Hexachlorobutadiene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | C/M |
| CDL-MW6-00-023042-02 | N | Hexachloroethane | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 LS U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Isophorone | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | m,p-Cresol | 2.00 | 2.00 S U | 2.00 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Naphthalene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Nitrobenzene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 S U | 0.920 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Pentachlorophenol | 2.00 | 1.50 S U | 1.50 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Phenanthrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-MW6-00-023042-02 | N | Pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-RB1-02-111516 | EB | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-RB1-02-111516 | EB | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(a)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Benzo(b)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzo(k)fluoranthene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RB1-02-111516 | EB | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-RB1-02-111516 | EB | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | C/I |
| CDL-RB1-02-111516 | EB | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | C/I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| I | Surrogate recovery outside project limits. |
| M | MS Recovery |
| TR | Trace Level Detect |
| V | Equipment Blank |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | Within project acceptance limits. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC outlier section |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC outlier section. It appears that some compounds were not spiked and have been qualified as J/UJ. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC outlier section. LCS only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Level 4**
**Initial Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/16/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** 6010C

**CALCULATIONS**

| | | | |
|---|---|---|---|
| Standard ID: | 6312001 | Reported Y-Intercept: | -0.000195 |
| Analyte: | Ag | Reported Slope: | 0.180503 |
| | | Reported Correlation Coefficient (r): | 0.999811 |

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | 0.00166 | 0.01 |
| Level 2 = | 0.01729 | 0.1 |
| Level 3 = | 0.08790 | 0.5 |
| Level 4 = | 0.18298 | 1 |

| | | |
|---|---|---|
| Y-Intercept = | -0.0012061 | Close match |
| Slope = | 0.18301519 | Close match |
| r2 = | 0.9995978 | |
| r = | 0.9997989 | Matches |

Comments:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/16/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** 6010C

**CALCULATIONS**

| | | | |
|---|---|---|---|
| CCV Standard ID: | CCV1 | CCV Standard ID: | CCV1 |
| Analyte ID: | Barium | Analyte ID: | Lead |
| CCV % Rec.: | 96 | CCV % Rec.: | 104 |
| True CCV Conc. = | 2.5 | True CCV Conc. = | 0.5 |
| Found CCV Conc. = | 2.397 | Found CCV Conc. = | 0.5179 |
| Calculated % Recovery = | 95.9 Matches | Calculated % Recovery = | 103.6 Matches |

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/16/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** 6010C

**CALCULATIONS**

LCS ID: RQ27186-002
Analyte ID: Sodium
Recovery: 98

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 39
LCS Spike Conc. = 40

% Recovery = 97.5 Matches

Comment: LCS only

**Level 4**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/16/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** 6010C

**CALCULATIONS**

| | | | |
|---|---|---|---|
| Sample ID: | RK17021-009MS | Sample ID: | RK17021-009MD |
| Analyte ID: | Ba | Analyte ID: | Nickel |
| Recovery: | 95 | RPD: | 0.98 |

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

| | | | |
|---|---|---|---|
| Conc. MS Sample = | 1.90 | MS Conc. = | 2.048 |
| Unspiked Samp. = | 0.04 | MSD Conc. = | 1.9706 |
| MS Spike Conc. = | 2.00 | | |
| | | RPD = | 3.85% |
| % Recovery = | 93 | | Doesn't match |

Comment:
RPD recalc based on concentration; lab calculation based on % Recovery.

**Level 4**
**ICP Serial Dilutions**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/16/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**CALCULATIONS**

Sample ID: CDL-MW6-00-023042-02L
Analyte ID: Na
%D: 20.3

Undiluted Sample Conc. = 6.015
Dilution Conc. = 7.239

Calculated %D = -20.349 Matches

%D Indicating Bias = 20.3

Comments:

**Level 4**
**Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/16/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** 6010C

**CALCULATIONS**

ug/L = Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor / Initial Sample Amount (g or mL)

Sample ID: **RK17021-006** CDL-MW4-01-009028-02

| Analyte | IDL (ug/L) | Corrected IDL (ug/L) | Labortory Reported (ug/L) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Vol. (mL) | Final Samp. Vol. (mL) |
|---|---|---|---|---|---|---|---|---|
| Al | | 0 | | **0** | | 1 | 50 | 50 |
| Ba | 0.0019 | 0.0019 | **0.013** | **0.01219** | 0.01219 | 1 | 50 | 50 |
| Ca | 0.13 | 0.13 | **19** | **19.025** | 19.025 | 1 | 50 | 50 |
| Co | | 0 | | **0** | | 1 | 50 | 50 |
| Cr | | 0 | | **0** | | 1 | 50 | 50 |
| Fe | 0.033 | 0.033 | **12** | **11.75** | 11.75 | 1 | 50 | 50 |
| K | 0.3 | 0.3 | **1.1** | **1.0851** | 1.0851 | 1 | 50 | 50 |
| Mg | 0.26 | 0.26 | **1.5** | **1.477** | 1.477 | 1 | 50 | 50 |
| Mn | | 0 | | **0** | | 1 | 50 | 50 |
| Na | 0.33 | 0.33 | **26** | **25.797** | 25.797 | 1 | 50 | 50 |
| Ni | | 0 | | **0** | | 1 | 50 | 50 |
| V | | 0 | | **0** | | 1 | 50 | 50 |
| Hg | | 0 | | **0** | | 1 | 20 | 20 |
| Ag | | 0 | | **0** | | 1 | 50 | 50 |
| As | 0.0022 | 0.0022 | **0.0038** | **0.00371** | 0.00371 | 1 | 50 | 50 |
| Be | | 0 | | **0** | | 1 | 50 | 50 |
| Cd | | 0 | | **0** | | 1 | 50 | 50 |
| Cu | | 0 | | **0** | | 1 | 50 | 50 |
| Pb | 0.0047 | 0.0047 | **0.0052** | **0.00517** | 0.00517 | 1 | 50 | 50 |
| Sb | | 0 | | **0** | | 1 | 50 | 50 |
| Mn | 0.00081 | 0.00081 | **0.18** | **0.18002** | 0.18002 | 1 | 50 | 50 |
| Ni | | 0 | | **0** | | 1 | 50 | 50 |
| Zn | | 0 | | **0** | | 1 | 50 | 50 |

Comments - Describe any condition which may have an impact on the identification and/or quantification of the reported results.

**Level 4**
**Initial Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Cal ID: 16HG2193
Analyte: Hg (11/23/16)

Correlation Coeff: 0.999979
Intercept: 0.01678
Slope: 0.00015365

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 0 | 1 |
| Level 2 = | 0.1 | 569 |
| Level 3 = | 0.2 | 1137 |
| Level 4 = | 1 | 6390 |
| Level 5 = | 2 | 12785 |
| Level 6 = | 5 | 32484 |

| | | |
|---|---|---|
| Corr Coef = | 0.999979 | Matches |
| Slope = | 0.000154 | Matches |
| Y-Int = | 0.01670 | Matches |

Comments:

**Tier 3**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

ICV Standard ID: ICV 16HG2193 (11/23/16) 22:57
Analyte ID: Hg
ICV % Rec.: 107.3

True ICV Conc. = 2.000
Found ICV Conc. = 2.1465

Calculated % D = 107.3

Comment:

**Tier 3**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

CCV Standard ID: CCV 16HG2190 (11/23/16) 01:40
Analyte ID: Hg
%D: 95.4

True CCV Conc. = 2.000
Found CCV Conc. = 1.9084

Calculated % D = 95.4

Comment:

**Tier 3**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

LCS ID: RQ27551-002 Batch 27551
Analyte ID: Hg
Recovery: 110

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 0.002206
LCS Spike Conc. = 0.0020

% Recovery = 110 Matches

Comments:

**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Comments: All sample results were non-detects

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8260B

**CALCULATIONS**

Tune ID: 15112216B,
Recalculated Ion Ratio: 175:174
Reported Ratio: 7.40%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 3887
Reference Mass Response = 52584

Relative Abundance = 7.39% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Service | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

| | | | |
|---|---|---|---|
| RRF Standard ID: | 15112216B.b | Calibration ID: | 15112216B.b |
| Compound ID: | Acrolein | Compound ID: | Acetone |
| Reported Result: | 0.072168 | %RSD: | 7.00000 |
| | | Average RRF = | 0.192842 |

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%RSD = Standard Deviation X 100 / Average RRF

| | | | | |
|---|---|---|---|---|
| Compound Area = | 1472 | RF Level 3 = | 0.212115 | |
| I.S. Area = | 203968 | RF Level 4 = | 0.188816 | |
| Compound Conc. = | 5 | RF Level 5 = | 0.189244 | |
| I.S. Conc. = | 50 | RF Level 6 = | 0.175801 | |
| | | RF Level 7 = | 0.198234 | |
| RRF = | 0.072168 | | | |
| | Matches | Standard Deviation = | 0.0134 | |
| | | Average RRF = | 0.192842 | Matches |
| | | %RSD = | 6.96 | Matches |

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Service | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

| | | | |
|---|---|---|---|
| RRF Standard ID: | 15112316, VSTD050LD | %D Standard ID: | 15112316, VSTD050LD |
| Compound ID: | Chloromethane | Compound ID: | Chlorobenzene |
| Reported Result: | 0.4880 | Reported %D: | 4.2% |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

| | | | |
|---|---|---|---|
| Compound Area = | 117787 | Average RRF = | 0.958926 |
| I.S. Area = | 241357 | CCV RRF = | 0.920151 |
| Compound Conc. = | 50 | | |
| I.S. Conc. = | 50 | %D = | 4.0 Matches |
| CCV RRF = | 0.4880 Matches | %D Indicating Bias = | -4.0 |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8260B

**CALCULATIONS**

Sample ID: CDL-MW6-00-02304202
Compound ID: 1,2-Dichloroethane-d4
Reported Result: 95%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 47.57
Surr. Spike Conc. = 50.00

% Recovery = 95 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**MATRIX SPIKE DUPLICATES**

SDG #: RK17021
Lab: Shealy Environmental Service
Client: CDM Smith

Date: 11/14/17
Page: 1 of 1
Validated by: GG
Second Review by: LS

Method: SW8260B

**CALCULATIONS**

Sample ID: RK17021-009MS
Compound ID: Acetone
Recovery: 91

Sample ID: RK17021-009MD
Compound ID: Trichlorofluoromethane
RPD: 5.3

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS = 91.0
Unspiked Samp. = 0.0
MS Spike Conc. = 100.0

% Recovery = 91 Matches

MS Conc. = 56.00
MSD Conc. = 59.00

RPD = 5.22 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Service | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8260B

**CALCULATIONS**

Sample ID: 6J24001-BS1
Compound ID: Cyclohexanone
Recovery: 92%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 46.00
LCS Spike Conc. = 50.00

% Recovery = 92 Matches

Comments: LCS only

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

Sample ID: CDL-MW4-00-009028-02
Compound ID: Ethylbenzene
Reported Result: 580 ug/L

Area = Slope * Conc. + Y-Intercept

$$\text{Conc. In Sample} = \frac{\text{Area - Y-Intercept}}{\text{Slope}} \times \text{Final Volume} \times \frac{\text{Dilution Factor}}{\text{Initial Amount}}$$

| | | Units |
|---|---|---|
| Area Sample = | 26727 | Area |
| Area I.S. = | 255857 | Area |
| Conc. I.S. = | 50.0 | |
| Average RRF = | 0.453 | NA |
| Final Volume = | 5.0 | mL |
| Initial Amount = | 5.0 | |
| Dilution Factor = | 50.0 | NA |
| Conc. In Sample = | 576.5 | |
| | Match | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/15/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

| | |
|---|---|
| Tune ID: | 10110916B.b |
| Recalculated Ion Ratio: | 443:442 |
| Reported Ratio: | 19.000% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 285568
Reference Mass Response = 1503232

Relative Abundance = 19.0 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/15/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

RRF Standard ID: msd10 10110916B.b L5
Compound ID: Phenol
Reported Result: 2.1134

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 1378160
I.S. Area = 1304213
Compound Conc. = 10.0
I.S. Conc. = 20

RRF = 2.1134
Matches

Calibration ID: 10110916B.b Std1 L5
Compound ID: 1,4-Dichlorobenzene
%RSD: 3.80%
Average RRF = 1.617788

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 1.488076
RF Level 2 = 1.578803
RF Level 3 = 1.631359
RF Level 4 = 1.594409
RF Level 5 = 1.620409
RF Level 6 = 1.63154
RF Level 7 = 1.64551
RF Level 8 = 1.67037
RF Level 9 = 1.69961

Standard Deviation = 0.054
Average RRF = 1.599 Matches
%RSD = 3.37 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/15/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 3 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

RRF Standard ID: 10112916B.b\101129B02
Compound ID: Acetophenone
Reported Result: 0.5346

%D Standard ID: SU2341-CC2340
Compound ID: Nitrobenzene
Reported %D: 7.9%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 1819513
I.S. Area = 4537838
Compound Conc. = 15
I.S. Conc. = 20

Average RRF = 0.44377
CCV RRF = 0.47868
%D = -7.87 Matches

CCV RRF = 0.5346 Matches

%D Indicating Bias = 7.9

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/15/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

Sample ID: RK17021-012
Compound ID: Terphenyl-d14
Reported Result: 45%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 4.48
Surr. Spike Conc. = 10.00

% Recovery = 45 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/15/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

### CALCULATIONS

Comments:

MS/MSD not spiked.

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: RK17021
Lab: Shealy Environmental Services
Client: CDM Smith

Date: 11/15/17
Page: 1 of 1
Validated by: GG
Second Review by: LS

Method: SW8270D

**CALCULATIONS**

Sample ID: RQ27430-002
Compound ID: 2-Chlorophenol
Recovery: 61%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 6.10
LCS Spike Conc. = 10.00

% Recovery = 61 Matches

Comments:
LCS only

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RK17021 | Date: | 11/15/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

Sample ID: CDL-MW1-00-047066-02 RK17021-007
Compound ID: Naphthalene
Reported Result: 0.083 ug/L

| | | Units |
|---|---|---|
| Area Sample = | 23293 | Area |
| Area I.S. = | 5224081 | Area |
| Conc. I.S. = | 20 | |
| Average RRF = | 1.077013 | NA |
| Final Volume = | 1000 | uL |
| Initial Amount = | 1000 | mL |
| Dilution Factor = | 1 | NA |
| Conc. In Sample = | 0.0828 | |
| | matches | |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q4 |
| SDG: | 10102_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Mark Lund, Project Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 27, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RB1-02-111516 | 10102003 | Water | Equipment Blank/EB | X |
| CDL-MW1-00-047066-02 | 10102007 | Water | Field Sample/N | X |
| CDL-MW2-00-029048-02 | 10102012 | Water | Field Sample/N | X |
| CDL-MW3-00-007026-02 | 10102011 | Water | Field Sample/N | X |
| CDL-MW4-00-009028-02 | 10102005 | Water | Field Sample/N | X |
| CDL-MW4-01-009028-02 | 10102006 | Water | Field Sample/N | X |
| CDL-MW5-00-009028-02 | 10102004 | Water | Field Sample/N | X |
| CDL-MW6-00-023042-02 | 10102008 | Water | Field Sample/N | X |
| CDL-PWTOC06-00-309450 | 10102001 | Water | Field Sample/N | X |
| CDL-PWTOC06-01-309450 | 10102002 | Water | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 10102_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 21 results (9.50%) out of the 221 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

The sample receipt checklist notes that samples 10102004,005, 008, 009 and 010 have 4% solids.

| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | The laboratory noted that MS/MSD recovery and RPD were outside control limits. |

November 14, 2017

Reviewed by Mark Lund, Project Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 27, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 12017461 (BS)/ 12017461 | 2,3,7,8-Tetrachlorodibenzofuran | 82.00 | 95 - 126 | 10 - 126 | percent | J/UJ | C | |
| 12017461 (BS)/ 12017461 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 85.50 | 88 - 135 | 10 - 135 | percent | J/UJ | C | |
| 12017462 (BD)/ 12017462 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 84.00 | 88 - 135 | 10 - 135 | percent | J/UJ | C | |
| 12017462 (BD)/ 12017462 | 2,3,7,8-Tetrachlorodibenzofuran | 87.50 | 95 - 126 | 10 - 126 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW1-00-047066-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.3 | 6.89 U | 6.89 UJ | - | pg/l | C |
| CDL-MW1-00-047066-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.3 | 6.89 U | 6.89 UJ | - | pg/l | C |
| CDL-MW2-00-029048-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.2 | 6.80 U | 6.80 UJ | - | pg/l | C |
| CDL-MW2-00-029048-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.2 | 6.80 U | 6.80 UJ | - | pg/l | C |
| CDL-MW3-00-007026-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.92 U | 6.92 UJ | - | pg/l | C |
| CDL-MW3-00-007026-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.92 U | 6.92 UJ | - | pg/l | C |
| CDL-MW4-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.9 | 7.27 U | 7.27 UJ | - | pg/l | C |
| CDL-MW4-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.9 | 7.27 U | 7.27 UJ | - | pg/l | C |
| CDL-MW4-01-009028-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.9 | 7.23 U | 7.23 UJ | - | pg/l | C |
| CDL-MW4-01-009028-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.9 | 7.23 U | 7.23 UJ | - | pg/l | C |
| CDL-MW5-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.8 | 7.16 U | 7.16 UJ | - | pg/l | C |
| CDL-MW5-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.8 | 7.16 U | 7.16 UJ | - | pg/l | C |
| CDL-MW6-00-023042-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.90 U | 6.90 UJ | - | pg/l | C/M |
| CDL-MW6-00-023042-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.90 U | 6.90 UJ | - | pg/l | C/M |
| CDL-PWTOC06-00-309450 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.5 | 6.99 U | 6.99 UJ | - | pg/l | C |

**Qualified Results associated with the LCS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-00-309450 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.5 | 6.99 U | 6.99 UJ | - | pg/l | C |
| CDL-PWTOC06-01-309450 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.94 U | 6.94 UJ | - | pg/l | C |
| CDL-PWTOC06-01-309450 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.94 U | 6.94 UJ | - | pg/l | C |
| CDL-RB1-02-111516 | EB | 2,3,7,8-Tetrachlorodibenzofuran | 10.3 | 6.84 U | 6.84 UJ | - | pg/l | C |
| CDL-RB1-02-111516 | EB | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.3 | 6.84 U | 6.84 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method E1613, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 10102010 (SD)/ 10102010 | Octachlorodibenzo-p-dioxin | 161.0 | 10 - 151 | 10 - 151 | percent | J/None | M | |
| 10102010 (MS)/ 10102010 | Octachlorodibenzo-p-dioxin | 198.0 | 10 - 151 | 10 - 151 | percent | J/None | M | |
| CDL-MW6-00-023042-02 (MS)/ 10102009 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 83.98 | 88 - 135 | 10 - 135 | percent | J/UJ | M | |
| CDL-MW6-00-023042-02 (MS)/ 10102009 | 2,3,7,8-Tetrachlorodibenzofuran | 85.44 | 95 - 126 | 10 - 126 | percent | J/UJ | M | |
| CDL-MW6-00-023042-02 (SD)/ 10102010 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 85.71 | 88 - 135 | 10 - 135 | percent | J/UJ | M | |
| CDL-MW6-00-023042-02 (SD)/ 10102010 | 2,3,7,8-Tetrachlorodibenzofuran | 86.70 | 95 - 126 | 10 - 126 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.90 U | 6.90 UJ | - | pg/l | C/M |
| CDL-MW6-00-023042-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.90 U | 6.90 UJ | - | pg/l | C/M |
| CDL-MW6-00-023042-02 | N | Octachlorodibenzo-p-dioxin | 104 | 378 | 378 J | | pg/l | M/D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method E1613, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| 10102010 (SD)/ 10102010 | Octachlorodibenzo -p-dioxin | 20.47 | < 20 | < 20 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW6-00-023042-02 | N | Octachlorodibenzo-p-dioxin | 104 | 378 | 378 J | | pg/l | M/D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

**Test Method: E1613 Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-MW1-00-047066-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.3 | 6.89 U | 6.89 UJ | - | pg/l | C |
| CDL-MW1-00-047066-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.3 | 6.89 U | 6.89 UJ | - | pg/l | C |
| CDL-MW2-00-029048-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.2 | 6.80 U | 6.80 UJ | - | pg/l | C |
| CDL-MW2-00-029048-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.2 | 6.80 U | 6.80 UJ | - | pg/l | C |
| CDL-MW3-00-007026-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.92 U | 6.92 UJ | - | pg/l | C |
| CDL-MW3-00-007026-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.92 U | 6.92 UJ | - | pg/l | C |
| CDL-MW4-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.9 | 7.27 U | 7.27 UJ | - | pg/l | C |
| CDL-MW4-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.9 | 7.27 U | 7.27 UJ | - | pg/l | C |
| CDL-MW4-01-009028-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.9 | 7.23 U | 7.23 UJ | - | pg/l | C |
| CDL-MW4-01-009028-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.9 | 7.23 U | 7.23 UJ | - | pg/l | C |
| CDL-MW5-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.8 | 7.16 U | 7.16 UJ | - | pg/l | C |
| CDL-MW5-00-009028-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.8 | 7.16 U | 7.16 UJ | - | pg/l | C |
| CDL-MW6-00-023042-02 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.90 U | 6.90 UJ | - | pg/l | C/M |
| CDL-MW6-00-023042-02 | N | Octachlorodibenzo-p-dioxin | 104 | 378 | 378 J | | pg/l | M/D |
| CDL-MW6-00-023042-02 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.90 U | 6.90 UJ | - | pg/l | C/M |
| CDL-PWTOC06-00-309450 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.5 | 6.99 U | 6.99 UJ | - | pg/l | C |
| CDL-PWTOC06-00-309450 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.5 | 6.99 U | 6.99 UJ | - | pg/l | C |
| CDL-PWTOC06-01-309450 | N | 2,3,7,8-Tetrachlorodibenzofuran | 10.4 | 6.94 U | 6.94 UJ | - | pg/l | C |
| CDL-PWTOC06-01-309450 | N | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.4 | 6.94 U | 6.94 UJ | - | pg/l | C |
| CDL-RB1-02-111516 | EB | 2,3,7,8-Tetrachlorodibenzofuran | 10.3 | 6.84 U | 6.84 UJ | - | pg/l | C |
| CDL-RB1-02-111516 | EB | 2,3,7,8-Tetrachlorodibenzo-p-dioxin | 10.3 | 6.84 U | 6.84 UJ | - | pg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Table of Results with Modified Qualifiers**

**Modified Qualifiers for test method E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | ADR Result | Modified Result | Reason |
|---|---|---|---|---|---|---|---|
| CDL-MW1-00-047066-02 | N | Octachlorodibenzo-p-dioxin | 103 | 68.9 U | 103 UJ | 68.9 U | |
| CDL-MW2-00-029048-02 | N | Octachlorodibenzo-p-dioxin | 102 | 354 | 354 J | 354 | |
| CDL-MW3-00-007026-02 | N | Octachlorodibenzo-p-dioxin | 104 | 458 | 458 J | 458 | |
| CDL-MW4-00-009028-02 | N | Octachlorodibenzo-p-dioxin | 109 | 166 | 166 J | 166 | |
| CDL-MW4-01-009028-02 | N | Octachlorodibenzo-p-dioxin | 109 | 123 | 123 J | 123 | |
| CDL-MW5-00-009028-02 | N | Octachlorodibenzo-p-dioxin | 108 | 285 | 285 J | 285 | |
| CDL-MW6-00-023042-02 | N | Octachlorodibenzo-p-dioxin | 104 | 378 | 378 J | 378 J | M/D |
| CDL-PWTOC06-00-309450 | N | Octachlorodibenzo-p-dioxin | 105 | 69.9 U | 105 UJ | 69.9 U | |
| CDL-PWTOC06-01-309450 | N | Octachlorodibenzo-p-dioxin | 104 | 69.4 U | 104 UJ | 69.4 U | |
| CDL-RB1-02-111516 | EB | Octachlorodibenzo-p-dioxin | 103 | 68.4 U | 103 UJ | 68.4 U | |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| D | MS RPD |
| M | MS Recovery |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | An ICV was analyzed but not confirmed that it was from a second source. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. It was noted that the laboratory control limits did not match those specified in the QAPP. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | See QC Outliers. It was noted that the laboratory control limits did not match those specified in the QAPP. |
| Stage 3 & 4 Review: Instrument - Tune? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | Some PQLs were raised with non-detections reported. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | | | • | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 10102
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b11nov16a-5
Compound ID: 2378-TCDD
Reported Result: 1.0870

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 39800
I.S. Area = 1830000
Compound Conc. = 2.0
I.S. Conc. = 100

RRF = 1.0874
Matches

Calibration ID: 11 Nov 2016 15:19:27
Compound ID: 2378-TCDD
%RSD: 3.80%
Average RRF = 1.13259

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 = 1.171
RF Level 2 = 1.072
RF Level 3 = 1.087
RF Level 4 = 1.141
RF Level 5 = 1.155
RF Level 6 = 1.171
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.043
Average RRF = 1.133 Matches
%RSD = 3.80 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

SDG #: 10102
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

RRF Standard ID: b05dec16c-1
Compound ID: 2378-TCDD
Reported Result: 1.063

Standard ID: b05dec16c-1
Compound ID: 2378-TCDD
Reported %D: -6.1%

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Compound Area = 52700
I.S. Area = 495000
Compound Conc. = 10
I.S. Conc. = 100

Average RRF = 1.133
CCV RRF = 1.063
%D = 6.18 Matches

CCV RRF = 1.065 Matches

%D Indicating Bias = -6.2

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

SDG #: 10102
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 10102001
Compound ID: 13C-2,3,7,8-TCDD
Reported Result: 76.4%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 1600.00
Surr. Spike Conc. = 2100.00

% Recovery = 76.2 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: 10102
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

| | | | |
|---|---|---|---|
| Sample ID: | 10102009 | Sample ID: | 10102009/10102010 |
| Compound ID: | 2378-TCDD | Compound ID: | 2378-TCDD |
| Recovery: | 84 | RPD: | 0.205 |

% Recovery = $\frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$

RPD = $\frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$

Conc. MS = 173
Unspiked Samp. = 0
MS Spike Conc. = 206

% Recovery = 84 Matches

MS Conc. = 173
MSD Conc. = 174

RPD = 0.576

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 10102
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/15/17
Page: 1 of 1
Validated by: ML
Second Review by: EM

Sample ID: 12017461
Compound ID: 2378-TCDD
Recovery: 85.5%

Sample ID: 12017461/12017462
Compound ID: 2378-TCDD
RPD: 1.50%

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

Conc. LCS = 171
LCS Spike Conc. = 200

LCS Conc. = 171
LCSD Conc. = 168

% Recovery = 85.5 Matches

RPD = 1.77 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 10102 | Date: | 11/15/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | ML |
| | | Second Review by: | EM |

Sample ID: 10102012
Compound ID: OCDD
Reported Result: 354 pg/L

Conc. In Sample = Area Cmpd. In Sample X Conc. of I.S. X Final Volume X Dilution Factor / Area IS X RF X Initial Volume

| | | Units |
|---|---|---|
| Area Sample = | 19300 | Area |
| Area I.S. = | 220000 | Area |
| Conc. I.S. = | 100 | |
| Average RRF = | 1.0160 | |
| Final Volume = | 0.040 | mL |
| Initial Amount = | 0.9794 | L |
| Dilution Factor = | 1.0 | NA |

Conc. In Sample = 0.353
Matches

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2017-Q4 |
| SDG: | SK09023 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | James Parker, Senior Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | January 30, 2018 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7470A | SW8270D |
|---|---|---|---|---|---|---|
| CDL-PWTOC06-00-309450 | SK09023-001 | Water | Field Sample/N | X | X | X |
| CDL-PWTOC06-01-309450 | SK09023-002 | Water | Field Sample/N | X | X | X |
| CDL-PWTOC06-04-309450 | SK09023-003 | Water | Field Sample/N | X | X | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) SK09023. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

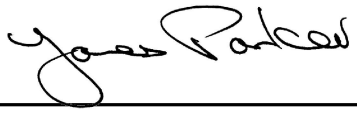
- Blank
- Blank - Negative
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 12 results (4.65%) out of the 258 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | No additional comments; see Checklist for detail. |
| SW7470A | The laboratory noted that the LLCCV was outside control limits with a high bias; however, all associated samples are non-detect. |
| SW8270D | The laboratory noted that the ICV was outside control limits with a high bias for 2,4-dimethyl phenol and hexachlorobutadiene; however, all associated samples are non-detect. |



January 26, 2018

Reviewed by James Parker, Senior Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

January 30, 2018

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| SQ56932-001 (LB)/ SQ56932-001 | Arsenic | 0.003100 | < 0.0025 | < 0.015 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW6010C, Total**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-00-309450 | N | Arsenic | 0.0150 | 0.00920 BJ | 0.0150 U | + | mg/l | L |
| CDL-PWTOC06-01-309450 | N | Arsenic | 0.0150 | 0.00990 BJ | 0.0150 U | + | mg/l | L |
| CDL-PWTOC06-04-309450 | N | Arsenic | 0.0150 | 0.0130 BJ | 0.0150 U | + | mg/l | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW7470A, Total, Low Level Calibration Verification**

Compliance requirements for satisfactory low level calibration verification is established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| LLCCV (LV) | Mercury | 125.0 | 80 - 120 | 80 - 120 | percent | J/None | V6 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| SVMS 3094 (IV) | bis(2-Chloroethoxy) methane | 120.1 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |
| SVMS 3094 (IV) | 2,4-Dimethylphenol | 120.3 | 80 - 120 | 80 - 120 | percent | J/None | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | 4-Chloroaniline | 120.0 | 15 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Dibenz (a,h)anthracene | 25.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | bis(2-Ethylhexyl) phthalate | 26.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Indeno(1,2,3-c,d)pyrene | 26.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Di-n-octyl phthalate | 27.00 | 35 - 135 | 10 - 135 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Benzo (g,h,i)perylene | 29.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Benzo(a)pyrene | 32.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Benzo (k)fluoranthene | 37.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Benzo (b)fluoranthene | 42.00 | 45 - 120 | 10 - 120 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Indeno(1,2,3-c,d)pyrene | 27.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Dibenz (a,h)anthracene | 28.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Di-n-octyl phthalate | 29.00 | 35 - 135 | 10 - 135 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | bis(2-Ethylhexyl) phthalate | 29.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Benzo (g,h,i)perylene | 32.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Benzo(a)pyrene | 32.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Benzo (k)fluoranthene | 37.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Benzo (b)fluoranthene | 40.00 | 45 - 120 | 10 - 120 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Chrysene | 52.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-04-309450 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Di-n-octyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Benzo(a)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Benzo(b)fluoranthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Benzo(k)fluoranthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Chrysene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | 4-Chloroaniline | 31.88 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PWTOC06-04-30945 (SD)/ SK09023-003MD | Terphenyl-d14 | 48.36 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PWTOC06-04-30945 (MS)/ SK09023-003MS | Terphenyl-d14 | 45.52 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: Total | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PWTOC06-00-309450 | N | Arsenic | 0.0150 | 0.00920 BJ | 0.0150 U | + | mg/l | L |
| CDL-PWTOC06-01-309450 | N | Arsenic | 0.0150 | 0.00990 BJ | 0.0150 U | + | mg/l | L |
| CDL-PWTOC06-04-309450 | N | Arsenic | 0.0150 | 0.0130 BJ | 0.0150 U | + | mg/l | L |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PWTOC06-04-309450 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Di-n-octyl phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Benzo(a)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Benzo(b)fluoranthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Benzo(k)fluoranthene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PWTOC06-04-309450 | N | Chrysene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| D | MS RPD |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |
| V1 | ICV |
| V6 | Low Level Calibration Verification |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outlier section. |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | | | • | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | It was noted that detections were found in the interferant check sample; however, the associated samples did not have comparable levels of interferants. No action required on this basis. |
| Stage 3 & 4 Review: Instrument - ICSAB? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted analyses that reported non-detects. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | See QC Outlier section. |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | | | • | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | The PQL was raised above the project specification in association with undiluted analyses that reported non-detects. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | | | • | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | See method comments. |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | Surrogates were outside control limits for the MS/MSD and no action is required on the normal samples. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | | • | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | See QC Outlier section. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outlier section; discrepancies that were noted between the lab report and the ADR are attributed to rounding. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project specifications in association with undiluted analyses that reported non-detects. |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Initial Calibration**

SDG #: SK09023
Lab: Shealy Environmental Services
Client: USACE

Date: 1/26/18
Page: 1 of 1
Validated by: JP
Second Review by: EM

| Date | Analyte | %Rec./Corr. Coef. | Criteria | Action | Associated Samples |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
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| | | | | | |
| | | | | | |

Standard ID:
Analyte: Mn

Reported Y-Intercept: 0
Reported Slope: 0.536316
Reported Correlation Coefficient (r): 0.999805

| | | | | | | |
|---|---|---|---|---|---|---|
| Level 1 = | 0 | 0.00309 | page 297 | Y-Intercept = | 0.01206079 | matches |
| Level 2 = | 0.015 | 0.01162 | page 299 | Slope = | 0.53082421 | close match |
| Level 3 = | 0.5 | 0.27315 | page 301 | r2 = | 0.99954 | |
| Level 4 = | 2.5 | 1.3816 | page 303 | r = | 0.9997712 | close match |
| Level 5 = | 5 | 2.6454 | page 305 | | | |
| Level 6 = | | | | | | |
| Level 7 = | | | | | | |

**Continuing Calibration**

SDG #: SK09023
Lab: Shealy Environmental Services
Client: USACE

Date: 1/26/18
Page: 1 of 1
Validated by: JP
Second Review by: EM

**CALCULATIONS**

CCV Standard ID: CCV3 11/12/2017 15:26
Analyte ID: Calcium
CCV % Rec.: 101% page 240

True CCV Conc. = 50 page 240
Found CCV Conc. = 50.497 page 424

Calculated % Recovery = 101.0% Matches

Comments:

**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| LCS ID: | SQ56932-002 | | LCS/LCSD ID: | | |
| Analyte ID: | Ba | | Analyte ID: | | |
| Recovery: | 98% | page 24 | RPD: | | |

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

| | | | | | |
|---|---|---|---|---|---|
| Conc. LCS = | 1.9625 | page 403 | LCS Conc. = | | |
| LCS Spike Conc. = | 2 | page 24 | LCSD Conc. = | | |
| % Recovery = | 98.1% | Matches | RPD = | #DIV/0! | Matches |

Comment: LCSD not analyzed, %RPD could not be validated

**ICSAB**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

ICSAB Standard ID: ICSA
Analyte ID: Fe
ICSAB % Rec.: 96% page 245

True ICSA Conc. = 500 page 245
ICSA Conc. = 478.2 page 313

Calculated % Recovery = 95.6 Matches

Comments: An ICSAB analysis was not reported

**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

Sample ID: SK09023-003MS
Analyte ID: Thallium
Recovery: 105% page 25

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

Conc. MS Sample = 0.84 page 416
Unspiked Samp. = 0.00 page 25
MS Spike Conc. = 0.80 page 25

% Recovery = 105.4% Matches

Sample ID: SK09023-003MS/MSD
Analyte ID: Sodium
RPD: 1.3% page 26

$$\text{RPD} = \frac{|\text{LCS Conc. - LCSD Conc.}|}{(\text{LCS Conc. + LCSD Conc.})/2} \times 100$$

MS Conc. =
MSD Conc. =

RPD = -1.3% Matches

## ICP Serial Dilutions

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

### CALCULATIONS

Sample ID: SK09023-003
Analyte ID: Potassium
%D: 3%

| | | |
|---|---|---|
| Undiluted Sample Conc. = | 19.271 | page 412 |
| Dilution Conc. = | 18.785 | page 421 |
| Calculated %D = | 2.5% | Matches |
| %D Indicating Bias = | 0.0 | |

Comments:

**Sample Result Verification**

SDG #: SK09023
Lab: Shealy Environmental Services
Client: USACE

Date: 1/26/18
Page: 1 of 1
Validated by: JP
Second Review by: EM

**CALCULATIONS**

ug/L = Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor
Initial Sample Amount (g or mL)

Sample ID: **CDL-PWT0C06-00-309450 (SK09023-001)** page 406-407

| Analyte | IDL (ug/L) | Corrected IDL (ug/L) | Labortory Reported (ug/L) | Corrected Result (ug/L) | Raw Data (ug/L) | Inst. Dilution Factor | Initial Samp. Vol. (mL) | Final Samp. Vol. (mL) |
|---|---|---|---|---|---|---|---|---|
| Al | | 0 | | | | 1 | 50 | 50 |
| Ba | | 0 | | | | 1 | 50 | 50 |
| Ca | | 0 | **20** | **20.4** | 20.399 | 1 | 50 | 50 |
| Co | | 0 | | | | 1 | 50 | 50 |
| Cr | | 0 | | | | 1 | 50 | 50 |
| Fe | | 0 | **0.41** | **0.409** | 0.4085 | 1 | 50 | 50 |
| K | | 0 | **19** | **19.2** | 19.199 | 1 | 50 | 50 |
| Mg | | 0 | **18** | **18.1** | 18.05 | 1 | 50 | 50 |
| Mn | | 0 | **0.0069** | **0.0069** | 0.00691 | 1 | 50 | 50 |
| Na | | 0 | **43** | **43.3** | 43.274 | 1 | 50 | 50 |
| Ni | | 0 | | | | 1 | 50 | 50 |
| V | | 0 | | | | 1 | 50 | 50 |
| Se | | 0 | | | | 1 | 50 | 50 |
| Ag | | 0 | | | | 1 | 50 | 50 |
| As | | 0 | **0.0092** | **0.00917** | 0.00917 | 1 | 50 | 50 |
| Be | | 0 | | | | 1 | 50 | 50 |
| Cd | | 0 | | | | 1 | 50 | 50 |
| Cu | | 0 | | | | 1 | 50 | 50 |
| Pb | | 0 | | | | 1 | 50 | 50 |
| Sb | | 0 | | | | 1 | 50 | 50 |
| Zn | | 0 | | | | 1 | 50 | 50 |

Comments -

**Level 4**
**Initial Calibration**

SDG #: SK09023
Lab: Shealy Environmental Services
Client: USACE

Date: 1/26/18
Page: 1 of 1
Validated by: JP
Second Review by: EM

**Method:** SW7470A

Cal ID: 05/12/16
Analyte: Hg

Correlation Coeff 0.9996498 page 577
Slope: 0.0002484
y-Intercept: 0.019045

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b) Page 577

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | -13 | 0 |
| Level 2 = | 475 | 0.1 |
| Level 3 = | 796 | 0.2 |
| Level 4 = | 3916 | 1 |
| Level 5 = | 7578 | 2 |
| Level 6 = | 20200 | 5 |
| Level 7 = | | |
| Level 8 = | | |
| Level 9 = | | |

| | | |
|---|---|---|
| Corr Coef = | 0.999649 | Matches |
| Slope = | 0.0002484 | Matches |
| Y-Int= | 0.019045 | Matches |

Comments:

**Level 4**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**Method:** SW7470A

ICV Standard ID: ICV1 page 569
Analyte ID: Hg
ICV % Rec.: 102.0%

True ICV Conc. = 2.000 page 582
Found ICV Conc. = 2.03

Calculated % D = 101.5% Matches

Comment:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**Method:** SW7470A

CCV Standard ID: CCV2
Analyte ID: Hg
%D: 10.0% page 569

Spiked Conc= 2.000 page 586
Reptd Conc= 1.8

Calculated % D = 10.0% matches

Comment:

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**Method:** SW7470A
**Matrix:** Water

---

LCS ID: SQ57433-002 LCS/LCSD ID:
Analyte ID: Hg Analyte ID:
Recovery: 99.0% page 28 RPD:

% Recovery = Conc. LCS / LCS Spike Conc. X 100

RPD= |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 x 100

Conc. LCS = 1.98 page 587 LCS Conc. =
LCS Spike Conc. = 2.000 LCSD Conc. =

% Recovery = 99.0% Matches RPD = #DIV/0! Match

Comments: The lab did not analyze an LCSD, therefore % RPD was not validated

**Level 4**
**Matrix Spike**

SDG #: SK09023
Lab: Shealy Environmental Services
Client: USACE

Date: 1/26/18
Page: 1 of 1
Validated by: JP
Second Review by: EM

**Method:** SW7470A
**Matrix:** Water

---

Sample ID: SK09023-003MS
Analyte ID: Hg
Recovery: 98

MS/MSD ID: SK09023-003MS/MSD
Analyte ID: Hg
RPD: 2.6 page 30

$$\%\ Rec = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$RPD = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

Conc. MS Sample = 1.95 page 587
Unspiked Samp. = 0.000
MS Spike Conc. = 2.0

% Recovery = 97.5 Matches

MS Conc. = 1.95
MSD Conc. = 1.9

RPD = 2.60 Matches

Comment:

**Level 4**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**Method:** SW7470A

**CALCULATIONS**

Sample ID:
Compound ID: Hg
Reported Result:

Conc. In Sample = ((Slope) x (Analyte Response) + Y-Intercept) X DF

| | | Units |
|---|---|---|
| Inst. Resp. = | | ug/L |
| Slope = | 0.0002484 | |
| Y-Int = | 0.0190 | |
| Initial Amount (ml) = | 50.0 | |
| Dilution Factor = | 1.0 | |
| Final Amount(ml)= | 50 | |
| Conc. In Sample = | 0.0190 | ug/L |

Comments: All samples were non-detect

Comments -

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

Tune ID: SVMS 3066 12/15/2017 10:58
Recalculated Ion Ratio: 275:198
Reported Ratio: 28.6% page 44

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 98096 page 189
Reference Mass Response = 343488 page 190

Relative Abundance = 28.6% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

RRF Standard ID: Level 5 | Calibration ID: 8270DLVI-11.M
Compound ID: o-Cresol | Compound ID: 4-Chloroaniline
Reported Result: 1.113921 page 72 | %RSD: 14.2% page 73
Average RRF = 0.339978

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

Compound Area = 398992 page 114
I.S. Area = 716374
Compound Conc. = 10.0
I.S. Conc. = 20

RF Level 1 =
RF Level 2 = 0.308303
RF Level 3 = 0.266382
RF Level 4 = 0.276534
RF Level 5 = 0.366313
RF Level 6 = 0.367991
RF Level 7 = 0.371443
RF Level 8 = 0.384777
RF Level 9 = 0.378082

RRF = 1.113921
Matches

Standard Deviation = 0.048
Average RRF = 0.339978 Matches
%RSD = 14.2 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| RRF Standard ID: | SVMS 3041 | | %D Standard ID: | SVMS 3041 | |
| Compound ID: | 2,4-Dinitrophenol | | Compound ID: | Fluoranthene | |
| Reported Result: | 0.176132 | pg. 177 | Reported %D: | 7.1% | |

CCV RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

%D = Average RRF - CCV RRF / Average RRF X 100

| | | | | | |
|---|---|---|---|---|---|
| Compound Area = | 394624 | page 179 | Average RRF = | 1.294944 | page 177 |
| I.S. Area = | 1493670 | | CCV RRF = | 1.387185 | |
| Compound Conc. = | 30 | | | | |
| I.S. Conc. = | 20 | | %D = | -7.1 | Matches |
| CCV RRF = | 0.176132 | Matches | %D Indicating Bias = | 7.1 | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

Sample ID: CDL-PWT0C06-01-3094
Compound ID: 2-Fluorobiphenyl
Reported Result: 46.00% page 36

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 4.64000 page 58
Surr. Spike Conc. = 10.00

% Recovery = 46 Matches

Comments: Surrogate spike concentrations were not documented in the lab report, therefore 10 was assumed

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

### CALCULATIONS

| | | | | | |
|---|---|---|---|---|---|
| Sample ID: | SK09023-003MS | | Sample ID: | SK09023-003MS/MSD | |
| Compound ID: | Benzo(a)pyrene | | Compound ID: | 4-Chloroaniline | |
| Recovery: | 32% | page 19 | RPD: | 28% | page 213 |

% Recovery = (Conc. MS - Conc. Unspiked Sample) / MS Spike Conc. X 100

RPD = |MS Conc. - MSD Conc.| / (MS Conc. + MSD Conc.)/2 X 100

| | | | | | |
|---|---|---|---|---|---|
| Conc. MS = | 3.22 | page 210 | MS % Rec = | 8.72 | page 209 |
| Unspiked Samp. = | 0.0 | page 63 | MSD % Rec = | 11.55 | page 215 |
| MS Spike Conc. = | 10.0 | page 207 | | | |
| | | | RPD = | 27.9 | Matches |
| % Recovery = | 32.2% | Matches | | | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

**CALCULATIONS**

| | | | |
|---|---|---|---|
| Sample ID: | SQ57043-002 | Sample ID: | |
| Compound ID: | Hexachlorocyclopentadiene | Compound ID: | |
| Recovery: | 33% | RPD: | |

% Recovery = (Conc. LCS / LCS Spike Conc.) X 100

RPD = (|LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2) X 100

| | | | | | |
|---|---|---|---|---|---|
| Conc. LCS = | 16.25 | page 201 | LCS Conc. = | | |
| LCS Spike Conc. = | 50.00 | page 199 | LCSD Conc. = | | |
| % Recovery = | 32.5% | Matches | RPD = | #DIV/0! | Matches |

Comments: LCS only, %RPD could not be recalculated

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | SK09023 | Date: | 1/26/18 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | USACE | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were recalculations performed on at least 10% of positive results? | **Yes** |
| Did all raw data agree with the final reported results? | **Yes** |
| Were positive hits verified by acceptable mass spectra? | **Yes** |
| Were all retention times within 0.06 RRT units of the daily standard? | **Yes** |

**CALCULATIONS**

Sample ID: CDL-PWT0C06-00-309450
Compound ID: Caprolactam
Reported Result: 1.2 page 49

Conc. In Sample = (Area Cmpd. In Sample X Conc. of I.S. X (Final Volume ÷ Initial Volume) X Dilution Factor)÷(% Solids)

| | | Units | |
|---|---|---|---|
| Area Sample = | 18284 | Area | page 52 |
| Area I.S. = | 2890516 | Area | page 51 |
| Conc. I.S. = | 20 | | |
| Average RRF = | 0.102672 | NA | page 73 |
| Final Volume = | 1.0 | mL | page 221 |
| Initial Amount = | 1000.0000 | ml | |
| Dilution Factor = | 1.0 | NA | page 49 |
| % Solids= | 100 | | |
| Conc. In Sample = | 1.2322 | | |
| | Matches | | |

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q3 |
| SDG: | RH24026 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Amy Bass, Data Review Chemist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | December 04, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A | SW7470A - Dissolved | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|
| CDL-RBPW1-02-082216 | RH24026-002 | Water | Equipment Blank/EB | | X | | X | X | X |
| CDL-RBPW2-02-082416 | RH24026-007 | Water | Equipment Blank/EB | X | | X | | X | X |
| CDL-RBPW3-02-082516 | RH24026-011 | Water | Equipment Blank/EB | X | | X | | X | X |
| CDL-RBPW4-02-082616 | RH24026-012 | Water | Equipment Blank/EB | X | | X | | X | X |
| CDL-RBPW5-02-082916 | RH24026-016 | Water | Equipment Blank/EB | | X | | X | X | X |
| CDL-RBPW6-02-083016 | RH24026-021 | Water | Equipment Blank/EB | | X | | X | X | X |
| CDL-PW11-00-002 | RH24026-009 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW12-00-002 | RH24026-001 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW13-00-002 | RH24026-006 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW14-00-002 | RH24026-003 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW14-01-002 | RH24026-004 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW15-00-002 | RH24026-005 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW16-00-002 | RH24026-017 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW16-01-002 | RH24026-018 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW17-00-002 | RH24026-019 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW18-00-002 | RH24026-022 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW18-01-002 | RH24026-023 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW19-00-002 | RH24026-014 | Water | Field Sample/N | | X | | X | X | X |
| CDL-PW20-00-002 | RH24026-010 | Water | Field Sample/N | | X | | X | X | X |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW6010C - Dissolved | SW7470A | SW7470A - Dissolved | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|---|
| CDL-PW21-00-002 | RH24026-013 | Water | Field Sample/N | | X | | X | X | X |
| CDL-TB2-03-082416 | RH24026-008 | Water | Trip Blank/TB | | | | | X | |
| CDL-TB3-03-082916 | RH24026-015 | Water | Trip Blank/TB | | | | | X | |
| CDL-TB4-03-083016 | RH24026-020 | Water | Trip Blank/TB | | | | | X | |
| CDL-TB5-03-083016 | RH24026-024 | Water | Trip Blank/TB | | | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RH24026. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

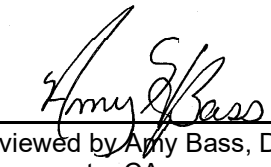
- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 884 results (31.04%) out of the 2848 results (sample and field QC samples) reported are qualified based on review and 3 results (0.11%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The lab noted the following:<br><br>The ICSA verification standard associated with samples -003 thru -007, -009 thru -014 and -016 thru -019 contained zinc at 0.022 mg/L which was marginally greater than the LOQ of 0.020 mg/L. Since there are no interferences for zinc, the likely source of the trace zinc contamination was confined to the ICSA solution, which will be monitored.<br><br>Sodium was present greater than the limit of detection of 1.0 mg/L, but was less than half the limit of quantitation concentration of 2.5 mg/L in the CCBs analyzed on 09/01/2016 at 18:35 (1.5 mg/L) and 19:30 (1.5 mg/L). Sample results with concentrations greater than the linear range standard concentration were diluted and reanalyzed.<br><br>The LCS associated with sample -022 is below acceptance criteria for silver. No sample remained for reanalysis.<br><br>The MS/MSD recoveries in batch 21756 were outside acceptance criteria. |
| SW7470A | The lab noted MS/MSD recoveries in batch 20976 were outside acceptance criteria. |
| SW8260B | The lab noted ICV associated with all samples except for -014 and -015 recovered high for DCDFM (123%) but all samples were ND. The CCV associated with samples -003 through -013 recovered high for TCFM (24%), but all samples were ND. |
| SW8270D | The lab noted the following:<br><br>The LCS associated with samples -001, -002, -003 through -007 and -009 through -012 failed low for 3,3-Dichlorobenzidine. No sample remained for re-extraction of samples -001 and -004. All other samples are re-extracted and re-analyzed, the LCS still failed for 3,3-Dichlorobenzidine. No sample remained for a third extraction.<br><br>Samples -003 through -006, -010, -013 and -019 failed low for surrogate recovery due to severe matrix interference.<br><br>The LCS associated with samples -021, -022 and -023 failed low for 3,3-Dichlorobenzidine. No sample remained for the re-extraction of sample -021. Samples -014, -017, -018, -022 and -023 failed low for surrogate recovery. Samples are re-extracted. The re-extracted LCS fails low for several analytes, but passes for 3,3 DCB. Samples -014 and -018 passed surrogate recovery, samples -017, -022 and -023 failed surrogates confirming matrix intereference (sulfur). This was confirmed through re-extraction.<br><br>ICV associated with samples -001 and -002 had a recovery for 2,4-dinitophenol at 75% which is below DOD limits of 80-120%.<br><br>The MS/MSD recoveries in batches 20682, 20871 and 21267 were outside acceptance criteria. |



November 24, 2017

Reviewed by Amy Bass, Data Review Chemist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

December 05, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Dissolved, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ21756-001 (LB)/ RQ21756-001 | Sodium | 0.3500 | < 0.33 | < 5 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW6010C, Dissolved, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Manganese | 0.002300 | < 0.00081 | < 0.015 | mg/l | U/None | V | |
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Barium | 0.004400 | < 0.0019 | < 0.025 | mg/l | U/None | V | |
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Zinc | 0.004700 | < 0.0022 | < 0.02 | mg/l | U/None | V | |
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Calcium | 0.1500 | < 0.13 | < 5 | mg/l | U/None | V | |
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Potassium | 0.7500 | < 0.3 | < 5 | mg/l | U/None | V | |
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Sodium | 3.900 | < 0.33 | < 5 | mg/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Manganese | 0.0008400 | < 0.00081 | < 0.015 | mg/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Zinc | 0.006500 | < 0.0022 | < 0.02 | mg/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Calcium | 0.1800 | < 0.13 | < 5 | mg/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Magnesium | 0.4100 | < 0.26 | < 5 | mg/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Sodium | 3.100 | < 0.33 | < 5 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Equipment Blank for SW6010C, Dissolved**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW11-00-002 | N | Manganese | 0.0150 | 0.00830 BJ | 0.0150 U | + | mg/l | V/L |
| CDL-PW12-00-002 | N | Zinc | 0.0200 | 0.00320 J | 0.0200 U | + | mg/l | V |
| CDL-PW19-00-002 | N | Zinc | 0.0200 | 0.00260 BJ | 0.0200 U | + | mg/l | V/L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Dissolved, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ21756-002 (BS)/ RQ21756-002 | Silver | 42.50 | 75 - 125 | 20 - 170 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW6010C, Dissolved**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 | N | Silver | 0.0100 | 0.00500 LS U | 0.00500 UJ | - | mg/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 (SD)/ RH24026-022MD | Sodium | 5250 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-PW18-00-002 (SD)/ RH24026-022MD | Selenium | 17.00 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-PW18-00-002 (SD)/ RH24026-022MD | Magnesium | 0.000 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-PW18-00-002 (MS)/ RH24026-022MS | Sodium | 3500 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-PW18-00-002 (MS)/ RH24026-022MS | Selenium | 18.25 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-PW18-00-002 (MS)/ RH24026-022MS | Magnesium | 0.000 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C, Dissolved**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 | N | Selenium | 0.0200 | 0.0170 S U | 0.0170 R | - | mg/l | M |
| CDL-PW18-01-002 | N | Selenium | 0.0200 | 0.0170 U | 0.0170 R | - | mg/l | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Dissolved, Serial dilution**

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 | Potassium | 17.50 | < 10 | < 10 | %d | J/UJ | A | |
| CDL-PW18-00-002 | Sodium | 41.00 | < 10 | < 10 | %d | J/UJ | A | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Serial dilution for SW6010C, Dissolved**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 | N | Potassium | 50.0 | 380 S | 380 J | | mg/l | A |
| CDL-PW18-00-002 | N | Sodium | 250 | 7500 S | 7500 J | | mg/l | A |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ21125-001 (LB)/ RQ21125-001 | Zinc | 0.003900 | < 0.0022 | < 0.02 | mg/l | U/None | L | |
| RQ21125-001 (LB)/ RQ21125-001 | Manganese | 0.007200 | < 0.00081 | < 0.015 | mg/l | U/None | L | |
| RQ21125-001 (LB)/ RQ21125-001 | Calcium | 0.1400 | < 0.13 | < 5 | mg/l | U/None | L | |
| RQ21125-001 (LB)/ RQ21125-001 | Magnesium | 0.3600 | < 0.26 | < 5 | mg/l | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW6010C, Total**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-RBPW2-02-082416 | EB | Magnesium | 5.00 | 0.370 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW3-02-082516 | EB | Calcium | 5.00 | 0.140 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW3-02-082516 | EB | Magnesium | 5.00 | 0.380 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW3-02-082516 | EB | Manganese | 0.0150 | 0.00530 BJ | 0.0150 U | + | mg/l | L |
| CDL-RBPW4-02-082616 | EB | Magnesium | 5.00 | 0.360 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW4-02-082616 | EB | Manganese | 0.0150 | 0.00340 BJ | 0.0150 U | + | mg/l | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBPW2-02-082416 (EB)/ RH24026-007 | Magnesium | 0.3700 | < 0.26 | < 5 | mg/l | U/None | V | |
| CDL-RBPW2-02-082416 (EB)/ RH24026-007 | Sodium | 1.100 | < 0.33 | < 5 | mg/l | U/None | V | |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | Manganese | 0.005300 | < 0.00081 | < 0.015 | mg/l | U/None | V | |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | Calcium | 0.1400 | < 0.13 | < 5 | mg/l | U/None | V | |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | Magnesium | 0.3800 | < 0.26 | < 5 | mg/l | U/None | V | |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | Sodium | 2.000 | < 0.33 | < 5 | mg/l | U/None | V | |
| CDL-RBPW4-02-082616 (EB)/ RH24026-012 | Manganese | 0.003400 | < 0.00081 | < 0.015 | mg/l | U/None | V | |
| CDL-RBPW4-02-082616 (EB)/ RH24026-012 | Magnesium | 0.3600 | < 0.26 | < 5 | mg/l | U/None | V | |
| CDL-RBPW4-02-082616 (EB)/ RH24026-012 | Sodium | 1.100 | < 0.33 | < 5 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | Acetone | 2.900 | < 2 | < 20 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH24026-009MD (SD)/ RH24026-009MD | Acetone | 32.80 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBPW1-02-082216 (EB)/ RH24026-002 | 4-Chloro-3-methylphenol | 1.000 | < 0.26 | < 1 | ug/l | U/None | V | |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | Benzaldehyde | 0.5900 | < 0.27 | < 5 | ug/l | U/None | V | |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | 4-Chloro-3-methylphenol | 16.00 | < 0.26 | < 1 | ug/l | U/None | V | Blank is over 3X RL |
| CDL-RBPW3-02-082516 (EB)/ RH24026-011 | Diethyl phthalate | 7.100 | < 0.19 | < 5 | ug/l | U/None | V | |
| CDL-RBPW4-02-082616 (EB)/ RH24026-012 | 4-Chloro-3-methylphenol | 15.00 | < 0.26 | < 1 | ug/l | U/None | V | Blank is over 3X RL |
| CDL-RBPW4-02-082616 (EB)/ RH24026-012 | Diethyl phthalate | 6.600 | < 0.19 | < 5 | ug/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Acetophenone | 0.3000 | < 0.23 | < 1 | ug/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Benzaldehyde | 0.7100 | < 0.27 | < 5 | ug/l | U/None | V | |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | 4-Chloro-3-methylphenol | 14.00 | < 0.26 | < 1 | ug/l | U/None | V | Blank is over 3X RL |
| CDL-RBPW5-02-082916 (EB)/ RH24026-016 | Diethyl phthalate | 5.800 | < 0.19 | < 5 | ug/l | U/None | V | |
| CDL-RBPW6-02-083016 (EB)/ RH24026-021 | Acetophenone | 0.3700 | < 0.23 | < 1 | ug/l | U/None | V | |
| CDL-RBPW6-02-083016 (EB)/ RH24026-021 | 4-Chloro-3-methylphenol | 15.00 | < 0.26 | < 1 | ug/l | U/None | V | Blank is over 3X RL |
| CDL-RBPW6-02-083016 (EB)/ RH24026-021 | Diethyl phthalate | 6.100 | < 0.19 | < 5 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Initial Calibration Verification**

Compliance requirements for satisfactory continuing calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data. Continuing calibration is performed to verify and evaluate instrument performance during sample analysis. Summary forms were evaluated against project acceptance criteria, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| ICV 19-Jul-2016 21:03 (IV) | 2,4-Dinitrophenol | 75.00 | 80 - 120 | 80 - 120 | percent | J/UJ | V1 | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Initial Calibration Verification for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I/V1 |
| CDL-RBPW1-02-082216 | EB | 2,4-Dinitrophenol | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | V1 |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ20682-002 (BS)/ RQ20682-002 | 3,3'-Dichlorobenzidine | 7.300 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |
| RQ20871-002 (BS)/ RQ20871-002 | 3,3'-Dichlorobenzidine | 6.800 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |
| RQ21267-002 (BS)/ RQ21267-002 | 3,3'-Dichlorobenzidine | 2.800 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW11-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-PW12-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QLS U | 2.00 R | - | ug/l | C/M/I |
| CDL-PW13-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW14-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW14-01-002 | N | 3,3'-Dichlorobenzidine | 5.60 | 2.20 QL U | 2.20 UJ | - | ug/l | C/I |
| CDL-PW15-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW18-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW18-01-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW20-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-RBPW1-02-082216 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW2-02-082416 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW3-02-082516 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW4-02-082616 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW6-02-083016 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 LS U | 2.00 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Hexachlorocyclopentadiene | 13.60 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Hexachloroethane | 29.00 | 30 - 95 | 10 - 95 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 34.00 | 35 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Benzo (g,h,i)perylene | 35.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Dibenz (a,h)anthracene | 35.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Indeno(1,2,3-c,d)pyrene | 35.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | bis(2-Chloroethoxy) methane | 38.00 | 45 - 105 | 10 - 105 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | 2-Nitrophenol | 39.00 | 40 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | bis(2-Ethylhexyl) phthalate | 39.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | 2-Methylnaphthalene | 40.00 | 45 - 105 | 10 - 105 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Nitrobenzene | 40.00 | 45 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Isophorone | 41.00 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Benzo(a)pyrene | 41.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Biphenyl (Diphenyl) | 42.00 | 49 - 109 | 10 - 109 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | 2,4-Dichlorophenol | 43.50 | 50 - 105 | 10 - 105 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | 4-Chlorophenyl phenyl ether | 45.00 | 50 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Acenaphthylene | 47.00 | 50 - 105 | 10 - 105 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Dibenzofuran | 50.00 | 55 - 150 | 10 - 150 | percent | J/UJ | M | |
| CDL-PW11-00-002 (SD)/ RH24026-009MD | Chrysene | 53.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW11-00-002 (MS)/ RH24026-009MS | Hexachlorocyclopentadiene | 18.40 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-PW11-00-002 (MS)/ RH24026-009MS | Benzo(a)pyrene | 51.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Atrazine | 14.50 | 20 - 100 | 10 - 100 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Hexachlorocyclopentadiene | 15.00 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Benzo (g,h,i)perylene | 30.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Dibenz (a,h)anthracene | 30.50 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Indeno(1,2,3-c,d)pyrene | 31.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Benzo(a)pyrene | 36.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Benzo (b)fluoranthene | 36.50 | 45 - 120 | 10 - 120 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Benzo (k)fluoranthene | 37.50 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | bis(2-Ethylhexyl) phthalate | 38.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Chrysene | 48.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | 3,3'-Dichlorobenzidine | 6.000 | 20 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Hexachlorocyclopentadiene | 16.00 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Atrazine | 17.50 | 20 - 100 | 10 - 100 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Benzo (g,h,i)perylene | 36.00 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Dibenz (a,h)anthracene | 37.50 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Indeno(1,2,3-c,d)pyrene | 38.50 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Benzo (b)fluoranthene | 43.50 | 45 - 120 | 10 - 120 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Benzo (k)fluoranthene | 44.00 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Benzo(a)pyrene | 44.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | 3,3'-Dichlorobenzidine | 6.000 | 20 - 110 | 10 - 110 | percent | J/R | M | |
| CDL-RBPW6-02-083016 (SD)/ RH24026-021MD | Hexachlorocyclopentadiene | 11.67 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (SD)/ RH24026-021MD | Dibenz (a,h)anthracene | 32.50 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (SD)/ RH24026-021MD | Pentachlorophenol | 39.58 | 40 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (SD)/ RH24026-021MD | Indeno(1,2,3-c,d)pyrene | 41.67 | 45 - 125 | 10 - 125 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBPW6-02-083016 (SD)/ RH24026-021MD | Benzo(a)pyrene | 50.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (MS)/ RH24026-021MS | Hexachlorocyclopentadiene | 11.67 | 20 - 123 | 10 - 123 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (MS)/ RH24026-021MS | Pentachlorophenol | 33.33 | 40 - 115 | 10 - 115 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (MS)/ RH24026-021MS | Dibenz (a,h)anthracene | 35.42 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-RBPW6-02-083016 (MS)/ RH24026-021MS | Benzo(a)pyrene | 50.00 | 55 - 110 | 10 - 110 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW11-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Chrysene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 U | 0.100 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Acenaphthylene | 0.200 | 0.160 U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Dibenzofuran | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Hexachloroethane | 1.00 | 0.400 U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Isophorone | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Nitrobenzene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW11-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | M |
| CDL-PW12-00-002 | N | Atrazine | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Chrysene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QLS U | 2.00 R | - | ug/l | C/M/I |
| CDL-PW12-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH24026-009MD (SD)/ RH24026-009MD | Hexachlorobenzene | 30.30 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2-Nitroaniline | 30.40 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Dimethyl phthalate | 31.11 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2,6-Dinitrotoluene | 33.60 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2,4,5-Trichlorophenol | 33.60 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Fluorene | 36.22 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 4-Chlorophenyl phenyl ether | 36.36 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Dibenzofuran | 37.40 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 4-Chloro-3-methylphenol | 39.37 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Acenaphthylene | 42.02 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | n-Nitrosodi-n-propylamine | 42.20 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | m,p-Cresol | 42.31 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2,4,6-Trichlorophenol | 42.52 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Acenaphthene | 42.74 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Biphenyl (Diphenyl) | 47.27 | < 30 | < 30 | rpd | J/None | D | |

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH24026-009MD (SD)/ RH24026-009MD | 2-Chloronaphthalene | 48.15 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2,4-Dimethylphenol | 48.15 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 4-Chloroaniline | 48.54 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Benzaldehyde | 50.00 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Acetophenone | 50.43 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2-Methylnaphthalene | 50.47 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | bis(2-Chloroethoxy) methane | 50.98 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Naphthalene | 51.33 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2-Methylphenol (o-Cresol) | 51.85 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Nitrobenzene | 51.85 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Phenol | 52.25 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2,4-Dichlorophenol | 53.16 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Hexachloroethane | 55.00 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2-Chlorophenol | 55.86 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Isophorone | 56.14 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 56.84 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | 2-Nitrophenol | 56.88 | < 30 | < 30 | rpd | J/None | D | |
| RH24026-009MD (SD)/ RH24026-009MD | Hexachlorobutadiene | 57.78 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 (N)/ RH24026-001 | Terphenyl-d14 | 37.90 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW12-00-002 (SD)/ RH24026-001MD | Terphenyl-d14 | 36.70 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW12-00-002 (MS)/ RH24026-001MS | Terphenyl-d14 | 39.68 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW13-00-002 (N)/ RH24026-006 | Terphenyl-d14 | 40.54 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW14-00-002 (N)/ RH24026-003 | Terphenyl-d14 | 39.31 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW14-01-002 (N)/ RH24026-004 | Terphenyl-d14 | 41.40 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW15-00-002 (N)/ RH24026-005 | Terphenyl-d14 | 42.86 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW16-00-002 (N)/ RH24026-017 | Terphenyl-d14 | 39.45 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW16-01-002 (N)/ RH24026-018 | Terphenyl-d14 | 33.79 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW17-00-002 (N)/ RH24026-019 | Terphenyl-d14 | 41.65 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW18-00-002 (N)/ RH24026-022 | Terphenyl-d14 | 37.85 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW18-01-002 (N)/ RH24026-023 | Terphenyl-d14 | 36.07 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW19-00-002 (N)/ RH24026-014 | Terphenyl-d14 | 31.17 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW20-00-002 (N)/ RH24026-010 | Nitrobenzene-d5 | 39.40 | 44 - 120 | 10 - 120 | percent | J/UJ | I | |
| CDL-PW20-00-002 (N)/ RH24026-010 | Terphenyl-d14 | 41.11 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |
| CDL-PW21-00-002 (N)/ RH24026-013 | Terphenyl-d14 | 33.55 | 50 - 134 | 10 - 134 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I/V1 |
| CDL-PW12-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QLS U | 2.00 R | - | ug/l | C/M/I |
| CDL-PW12-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW12-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Atrazine | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Chrysene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 QS U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW13-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW13-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW14-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW14-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW14-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4,5-Trichlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4,6-Trichlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dichlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dimethylphenol | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dinitrophenol | 5.60 | 3.60 Q U | 3.60 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dinitrotoluene | 2.20 | 1.10 Q U | 1.10 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,6-Dinitrotoluene | 2.20 | 1.10 Q U | 1.10 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Chloronaphthalene | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Chlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Methylnaphthalene | 0.220 | 0.110 Q U | 0.110 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Methylphenol (o-Cresol) | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Nitroaniline | 2.20 | 1.80 Q U | 1.80 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Nitrophenol | 2.20 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 3,3'-Dichlorobenzidine | 5.60 | 2.20 QL U | 2.20 UJ | - | ug/l | C/I |
| CDL-PW14-01-002 | N | 3-Nitroaniline | 2.20 | 1.80 Q U | 1.80 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4,6-Dinitro-2-methylphenol | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Bromophenyl phenyl ether | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Chloro-3-methylphenol | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Chloroaniline | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Chlorophenyl phenyl ether | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Nitroaniline | 2.20 | 1.80 Q U | 1.80 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Nitrophenol | 5.60 | 2.20 Q U | 2.20 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Acenaphthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Acenaphthylene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW14-01-002 | N | Acetophenone | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Anthracene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Atrazine | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzaldehyde | 5.60 | 2.20 Q U | 2.20 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(a)anthracene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(a)pyrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(b)fluoranthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(g,h,i)perylene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(k)fluoranthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzyl butyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Biphenyl (Diphenyl) | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | bis(2-Chloroethoxy) methane | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | bis(2-Ethylhexyl) phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Caprolactam | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Carbazole | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Chrysene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Dibenz(a,h)anthracene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Dibenzofuran | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Diethyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Dimethyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Di-n-butyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Di-n-octyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Fluoranthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Fluorene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachlorobenzene | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachlorobutadiene | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachlorocyclopentadiene | 5.60 | 3.60 Q U | 3.60 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachloroethane | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Indeno(1,2,3-c,d)pyrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Isophorone | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | m,p-Cresol | 2.20 | 2.20 Q U | 2.20 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Naphthalene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Nitrobenzene | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | n-Nitrosodi-n-propylamine | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | n-Nitrosodiphenylamine | 1.10 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Pentachlorophenol | 2.20 | 1.70 Q U | 1.70 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Phenanthrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Phenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Pyrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW15-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW15-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW15-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW16-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW16-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW16-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-01-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-01-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW16-01-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW16-01-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW17-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW17-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW17-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW17-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW18-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 0.750 JQL | 0.750 J | - | ug/l | I/TR |
| CDL-PW18-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-01-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 0.730 JQL | 0.730 J | - | ug/l | I/TR |
| CDL-PW18-01-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-01-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW19-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW20-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW20-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW20-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW20-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW20-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW21-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Qualified Results associated with the Surrogate for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW21-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW21-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: Dissolved | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW11-00-002 | N | Manganese | 0.0150 | 0.00830 BJ | 0.0150 U | + | mg/l | V/L |
| CDL-PW12-00-002 | N | Zinc | 0.0200 | 0.00320 J | 0.0200 U | + | mg/l | V |
| CDL-PW18-00-002 | N | Potassium | 50.0 | 380 S | 380 J | | mg/l | A |
| CDL-PW18-00-002 | N | Sodium | 250 | 7500 S | 7500 J | | mg/l | A |
| CDL-PW18-00-002 | N | Selenium | 0.0200 | 0.0170 S U | 0.0170 R | - | mg/l | M |
| CDL-PW18-00-002 | N | Silver | 0.0100 | 0.00500 LS U | 0.00500 UJ | - | mg/l | C |
| CDL-PW18-01-002 | N | Selenium | 0.0200 | 0.0170 U | 0.0170 R | - | mg/l | M |
| CDL-PW19-00-002 | N | Zinc | 0.0200 | 0.00260 BJ | 0.0200 U | + | mg/l | V/L |

| Test Method: SW6010C | Extraction Method: Total | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-RBPW2-02-082416 | EB | Magnesium | 5.00 | 0.370 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW3-02-082516 | EB | Calcium | 5.00 | 0.140 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW3-02-082516 | EB | Magnesium | 5.00 | 0.380 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW3-02-082516 | EB | Manganese | 0.0150 | 0.00530 BJ | 0.0150 U | + | mg/l | L |
| CDL-RBPW4-02-082616 | EB | Magnesium | 5.00 | 0.360 BJ | 5.00 U | + | mg/l | L |
| CDL-RBPW4-02-082616 | EB | Manganese | 0.0150 | 0.00340 BJ | 0.0150 U | + | mg/l | L |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW11-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 S U | 4.00 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Chrysene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 S U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 U | 0.100 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Acenaphthylene | 0.200 | 0.160 U | 0.160 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Dibenzofuran | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Hexachloroethane | 1.00 | 0.400 U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Isophorone | 1.00 | 0.800 S U | 0.800 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Nitrobenzene | 1.00 | 0.400 S U | 0.400 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 S U | 3.20 UJ | - | ug/l | M |
| CDL-PW11-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW12-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I/V1 |
| CDL-PW12-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW12-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 QS U | 1.60 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Chrysene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 QS U | 4.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW12-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 QS U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW12-00-002 | N | Atrazine | 1.00 | 0.400 QS U | 0.400 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 QS U | 0.160 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 QS U | 3.20 UJ | - | ug/l | M/I |
| CDL-PW12-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QLS U | 2.00 R | - | ug/l | C/M/I |
| CDL-PW13-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW13-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW13-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW13-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW14-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW14-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW14-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW14-01-002 | N | 2,4,5-Trichlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4,6-Trichlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dichlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dimethylphenol | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dinitrophenol | 5.60 | 3.60 Q U | 3.60 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,4-Dinitrotoluene | 2.20 | 1.10 Q U | 1.10 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2,6-Dinitrotoluene | 2.20 | 1.10 Q U | 1.10 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Chloronaphthalene | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Chlorophenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Methylnaphthalene | 0.220 | 0.110 Q U | 0.110 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Methylphenol (o-Cresol) | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW14-01-002 | N | 2-Nitroaniline | 2.20 | 1.80 Q U | 1.80 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 2-Nitrophenol | 2.20 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 3-Nitroaniline | 2.20 | 1.80 Q U | 1.80 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4,6-Dinitro-2-methylphenol | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Bromophenyl phenyl ether | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Chloro-3-methylphenol | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Chloroaniline | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Chlorophenyl phenyl ether | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Nitroaniline | 2.20 | 1.80 Q U | 1.80 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 4-Nitrophenol | 5.60 | 2.20 Q U | 2.20 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Acenaphthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Acenaphthylene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Acetophenone | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Anthracene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Atrazine | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzaldehyde | 5.60 | 2.20 Q U | 2.20 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(a)anthracene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(a)pyrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(b)fluoranthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(g,h,i)perylene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzo(k)fluoranthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Benzyl butyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Biphenyl (Diphenyl) | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | bis(2-Chloroethoxy) methane | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | bis(2-Ethylhexyl) phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Caprolactam | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Carbazole | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Chrysene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Dibenz(a,h)anthracene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Dibenzofuran | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Diethyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Dimethyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Di-n-butyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Di-n-octyl phthalate | 5.60 | 4.50 Q U | 4.50 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Fluoranthene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Fluorene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachlorobenzene | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachlorobutadiene | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Hexachlorocyclopentadiene | 5.60 | 3.60 Q U | 3.60 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW14-01-002 | N | Hexachloroethane | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Indeno(1,2,3-c,d)pyrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Isophorone | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | m,p-Cresol | 2.20 | 2.20 Q U | 2.20 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Naphthalene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Nitrobenzene | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | n-Nitrosodi-n-propylamine | 1.10 | 0.880 Q U | 0.880 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | n-Nitrosodiphenylamine | 1.10 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Pentachlorophenol | 2.20 | 1.70 Q U | 1.70 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Phenanthrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Phenol | 1.10 | 0.440 Q U | 0.440 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | Pyrene | 0.220 | 0.180 Q U | 0.180 UJ | - | ug/l | I |
| CDL-PW14-01-002 | N | 3,3'-Dichlorobenzidine | 5.60 | 2.20 QL U | 2.20 UJ | - | ug/l | C/I |
| CDL-PW15-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW15-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW15-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW16-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW16-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW16-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW16-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-01-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW16-01-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW16-01-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW16-01-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW16-01-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW16-01-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW17-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW17-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW17-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW17-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW17-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW18-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 0.750 JQL | 0.750 J | - | ug/l | I/TR |
| CDL-PW18-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW18-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW18-01-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW18-01-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 0.730 JQL | 0.730 J | - | ug/l | I/TR |
| CDL-PW18-01-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 QL U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 QL U | 4.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW18-01-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW19-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW19-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW19-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW19-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW19-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW20-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | | ug/l | I |

**Table of All Qualified Results**

**Test Method: SW8270D Extraction Method: SW3520C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-PW20-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |
| CDL-PW20-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW20-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 QL U | 2.00 UJ | - | ug/l | C/I |
| CDL-PW21-00-002 | N | 2,4,5-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4,6-Trichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dichlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dimethylphenol | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW21-00-002 | N | 2,4-Dinitrophenol | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,4-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2,6-Dinitrotoluene | 2.00 | 1.00 Q U | 1.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Chloronaphthalene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Chlorophenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Methylnaphthalene | 0.200 | 0.100 Q U | 0.100 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Methylphenol (o-Cresol) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 2-Nitrophenol | 2.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 3,3'-Dichlorobenzidine | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 3-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4,6-Dinitro-2-methylphenol | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Bromophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Chloro-3-methylphenol | 1.00 | 0.800 Q U | 0.800 UJ | | ug/l | I |
| CDL-PW21-00-002 | N | 4-Chloroaniline | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Chlorophenyl phenyl ether | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Nitroaniline | 2.00 | 1.60 Q U | 1.60 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | 4-Nitrophenol | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Acenaphthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Acenaphthylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Acetophenone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Atrazine | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzaldehyde | 5.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(a)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(a)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(b)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(g,h,i)perylene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzo(k)fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Benzyl butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Biphenyl (Diphenyl) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | bis(2-Chloroethoxy) methane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | bis(2-Chloroethyl) ether (2-Chloroethyl ether) | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | bis(2-Ethylhexyl) phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Caprolactam | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Carbazole | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Chrysene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Dibenz(a,h)anthracene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Dibenzofuran | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Diethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | | ug/l | I |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-PW21-00-002 | N | Dimethyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Di-n-butyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Di-n-octyl phthalate | 5.00 | 4.00 Q U | 4.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Fluoranthene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Fluorene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachlorobenzene | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachlorobutadiene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachlorocyclopentadiene | 5.00 | 3.20 Q U | 3.20 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Hexachloroethane | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Indeno(1,2,3-c,d)pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Isophorone | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | m,p-Cresol | 2.00 | 2.00 Q U | 2.00 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Naphthalene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Nitrobenzene | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | n-Nitrosodi-n-propylamine | 1.00 | 0.800 Q U | 0.800 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | n-Nitrosodiphenylamine | 1.00 | 0.920 Q U | 0.920 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Pentachlorophenol | 2.00 | 1.50 Q U | 1.50 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Phenanthrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Phenol | 1.00 | 0.400 Q U | 0.400 UJ | - | ug/l | I |
| CDL-PW21-00-002 | N | Pyrene | 0.200 | 0.160 Q U | 0.160 UJ | - | ug/l | I |
| CDL-RBPW1-02-082216 | EB | 2,4-Dinitrophenol | 5.00 | 3.20 U | 3.20 UJ | - | ug/l | V1 |
| CDL-RBPW1-02-082216 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW2-02-082416 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW3-02-082516 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW4-02-082616 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |
| CDL-RBPW6-02-083016 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 LS U | 2.00 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| A | Serial dilution |
| C | LCS Recovery |
| D | MS RPD |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |
| V | Equipment Blank |
| V1 | ICV |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on all COCs |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | | • | | Not reported |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | Some MDLs exceeded the QAPP DL, but all were below the Project LOQ. |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | Contaminants were detected at concentrations > 2× MDL. |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | RL anomalies noted |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on all COCs. |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | MS %R for -009 noted as high, but within project limits. No action taken. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | | | • | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on all COCs. |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | | | • | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS Only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | RL anomalies noted |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | FedEx "Rec'd By" info missing on all COCs. |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - ICAL? | | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. See QC Outliers. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | RL anomalies noted |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH24026 Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### Recalculation of Initial Calibration (ICAL) Correlation Coefficient:

| | |
|---|---|
| **Calibration ID:** | 8/26/2016 14:47:55 |
| **Analyte:** | Silver |

| Sample Name | TRUE | Found | (S)IR * | |
|---|---|---|---|---|
| Blank | 0 | 0 | 0.00045 | 12:26 |
| CAL1 MW-8057 | 0.01000 | 0.00997 | 0.00207 | 12:30 |
| CAL2 MW-8064 | 0.10000 | 0.09996 | 0.01672 | 12:35 |
| CAL3 MW-8065 | 0.50000 | 0.50372 | 0.08244 | 12:39 |
| CAL4 MW-8029 | 1.0000 | 0.99635 | 0.16263 | 12:44 |

| | | | |
|---|---|---|---|
| **Reported Correlation:** | | **0.999987** | |
| **Calculated:** | **$R^2$ =** | 0.999969 | |
| | **R =** | **0.999985** | ***Match*** |

### QC Element: Initial Calibration Verificaton (ICV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Conc.<br>(Calc'd) * | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|
| **ICV MW-8067 - 8/26/2016 12:53:14** | | | | | | |
| Calcium | 50.0000 | **50.7380** | **50.7380**<br>***Match*** | **101** | **101**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

%R - Percent Recovered = 100% × FOUND / TRUE

* Average of 3 readings

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water | Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verificaton (CCV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Conc.<br>(Calc'd) * | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|
| **CCV2 - 8/29/2016 17:02** | | | | | | **(p.880, 1219)** |
| Nickel | 2.5000 | **2.4014** | **2.4014**<br>***Match*** | **96** | **96**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

%R - Percent Recovered = 100% × FOUND / TRUE

* Average of 3 readings

### QC Element: Interference Check Sample (ICS) - A/AB

ICSAB MW-6608

| Analyte | TRUE<br>Conc'n | Reported<br>Result / A | %Rec / A<br>(Reported) | %Rec / A<br>(Calc'd) | Reported<br>Result / AB | %Rec / AB<br>(Reported) | %Rec / AB<br>(Calc'd) |
|---|---|---|---|---|---|---|---|
| Calcium | 500 | 491 | **98** | **98**<br>***Match*** | 481 | **96** | **96**<br>***Match*** |

%R - Percent Recovered = 100% × FOUND / TRUE

### QC Element: Laboratory Control Sample (LCS)

| Analyte | LCS Spike<br>Added | LCS<br>Result | %Rec<br>(Reported) | %Rec<br>(Calc'd) | Note |
|---|---|---|---|---|---|
| **LCS / Batch 21125 (9/1/2016 18:07) - RQ21125-002** | | | | | |
| Nickel | 2.0 | 2.07897<br>* | **104** | **104**<br>***Match*** | Control Limits:<br>75 - 125 |

%R - Percent Recovered = 100% × ( Result / Spike Added )

* Average of 3 readings

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH24026 Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Iron | 0.04343 | 20 | 19.421 | **97** | **97** *Match* | ok (87 - 111) |

MS/MSD Sample ID = RH24026-022MS/MSD

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

| MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|
| 18.900 | **94** | **94** *Match* | ok (87 - 111) |

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **2.7** | **2.7** *Match* | ok (< 20) |

### QC Element: Post Digestion Spike

| Lab Sample ID / Analyte | Conc. TRUE | Sample Conc. | Conc. (Reported) | Conc. (Calc'd) * | %R (Reported) | %R (Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **RH24026-022dis / RH24026-022disA** | | | | | | | **Control Limits: (QAPP)** |
| Calcium | 40.00 | 330.39 | **388.94** | **388.94** *Match* | **146** | **146** *Match* | 75 - 125 FAIL (>) |

%R - Percent Recovered = 100% × FOUND / TRUE

* Average of 3 readings

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW6010C

SDG #: RH24026 Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Serial Dilution

| Lab Sample ID<br>Analyte | Initial Result | Serial Result | %Diff (Reported) | %Diff (Calc'd) | Comment |
|---|---|---|---|---|---|
| **RH24026-022 / RH24026-022L** | **( 1× )** | **( 5× )** | | | **Control Limits: (NFG)** |
| Sodium | 7453.5 | 10508.75 | **41** | **41.0**<br>***Match*** | ≤ 10% FAIL |

* Concentration after correction for 5× dilution.

%Diff: %Difference = 100% × ABS [ Dilution Result – Initial Result ] / Initial Result

### Recalculation of Sample Results:

| Lab Sample ID<br>Analyte | Raw Conc. * | Dilution Factor | Conc. (Reported) | Conc. (Calc'd) * |
|---|---|---|---|---|
| **RH24026-022 / CDL-PW18-00-002** | | | | |
| Iron (Dissolved) | 0.04343<br>* | 1 | **0.043** | **0.043**<br>***Match*** |

* Average of 3 results.

Concentration = ( Raw Conc. ) × Dilution

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water | Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### Recalculation of Initial Calibration (ICAL) Correlation Coefficient:

| | | | |
|---|---|---|---|
| **Date:** | 9/12/2016 | 16:07 - 16:15 | (Applicable to Batch 21721) |
| **Analyte:** | Mercury | | |

| Sample Name | TRUE | Found | Response |
|---|---|---|---|
| Blank | 0.000 | 0.023 | 57 |
| CAL 0.1- 16HG0996(09/13/16) | 0.100 | 0.107 | 684 |
| CAL 0.2- 16HG0995(09/13/16) | 0.200 | 0.213 | 1471 |
| CAL 1.0- 16HG0994(09/13/16) | 1.000 | 0.996 | 7306 |
| CAL 2.0- 16HG0993(09/13/16) | 2.000 | 1.936 | 14322 |
| CAL 5.0- 16HG0992(09/13/16) | 5.000 | 5.025 | 37350 |

| | Reported | Calc'd | |
|---|---|---|---|
| $R^2$ | NA | 0.999707 | |
| Correlation (R) | 0.9998536 | 0.9998535 | ***Match*** |
| Slope (B) | 1.341E-04 | 1.341E-04 | ***Match*** |
| Intercept (C) | 1.5750E-02 | 1.5645E-02 | ***~ Match*** |

### QC Element: Initial Calibration Verificaton (ICV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **ICV1 - 9/12/2016 16:16** | | | | | | | |
| Mercury | 0.002000 | **0.002094** | 15498 | **0.002094**<br>***Match*** | **105** | **105**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × FOUND / TRUE

| | |
|---|---|
| B: | 1.341E-04 |
| C: | 1.5750E-02 |

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water | Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verificaton (CCV)

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) | Comment |
|---|---|---|---|---|---|---|---|
| **CCV2 -9/12/2016 17:07** | | | | | | | |
| Mercury | 0.002000 | **0.001819** | 13448 | **0.001819**<br>***Match*** | **91** | **91**<br>***Match*** | Control Limits:<br>±10% = 90 - 110% |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × FOUND / TRUE

B: 1.341E-04
C: 1.5750E-02

### QC Element: Laboratory Control Sample (LCS)

| Analyte | Dilution<br>Factor | LCS Spike<br>Added | LCS Conc.<br>(Reported) | Instrument<br>Response | Conc.<br>(Calc'd) | %Rec<br>(Reported) | %Rec<br>(Calc'd) | Note |
|---|---|---|---|---|---|---|---|---|
| **LCS / RQ21721-002 (9/12/2016 17:16) - Batch 21721** | | | | | | | | |
| Mercury | 1 | 0.0020 | **0.0021** | 15294 | **0.0021**<br>***Match*** | **103** | **103**<br>***Match*** | Control Limits:<br>75 - 125 |

Conc. = ( 0.001 mg/µg) × Dilution × [ ( Response × B ) + C ]
%R = Percent Recovered = 100% × ( Result / Spike )

B: 1.341E-04
C: 1.5750E-02

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH24026 Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| **MS/MSD – RH24026-022MS/MSD (9/12/2016 17:35/17:37) – Batch 21721** | | | | | | |
| Mercury (Dissolved) | 0.000030 | 0.0020 | 0.00212 | **105** | **105** ***Match*** | ok (75 - 125) |

| | MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|---|
| %Rec = Percent Recovery = 100% × ( Result / Spike Added ) | 0.0020509 | **101** | **101** ***Match*** | ok (75 - 125) |

| RPD = Relative Percent Difference = 100% × ABS[Result1 - Result2] / AVG[Result1, Result2] | RPD (Reported) | RPD (Calc) | Note |
|---|---|---|---|
| | **3.3** | **3.3** ***Match*** | ok (< 30) |

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW7040A

SDG #: RH24026 Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. Validated by: AB
Client: Wallops Flight Facility Second Review by: LS

**Matrix:** Water Concentrations are in milligrams per liter (mg/L) unless noted otherwise.

**Recalculation of Sample Results:**

| Lab Sample ID<br>Analyte | Instrument Response | Dilution Factor | Raw Conc'n | Conc. (Reported) | Conc. (Calc'd) |
|---|---|---|---|---|---|
| **RH24026-022 / CDL-PW18-00-002 (9/12/2016 17:33)** | | | | | |
| Mercury | 104 | 1 | 0.0297 (calc'd) | **0.000030 J** | **0.000030** ***Match*** |

Raw Conc. = ( Response × B ) + C

B: 1.341E-04
C: 1.575E-02

Concentration = ( Raw Conc. ) × ( 0.001 mg/µg ) × Dilution

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8260B

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**Recalculation of Initial Calibration (ICAL) RFs, Mean RF, RSD:**

IS Internal Standard: 1,4-Difluorobenzene-d4

| Analyte | | Lvl#1 | Lvl#2 | Lvl#3 | Lvl#4 | Lvl#5 | Lvl#6 | Lvl#7 | Lvl#8 | Lvl#9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,4-Dichlorobenzene | | | | | | | | | | |
| | Conc. [STD]: | 0.5 | 1 | 5 | 20 | 50 | 100 | 200 | | |
| | Response: | 2787 | 5938 | 30389 | 120759 | 303004 | 626300 | 1349253 | | |
| | Conc. [IS]: | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | | |
| | Response [IS]: | 226718 | 219391 | 233392 | 235671 | 246897 | 259363 | 270739 | | |
| | Reported RF: | **1.229280** | **1.353292** | **1.302058** | **1.281013** | **1.227249** | **1.207381** | **1.245898** | | |
| *Match* | Calc'd RF: | **1.229280** | **1.353292** | **1.302058** | **1.281013** | **1.227249** | **1.207381** | **1.245898** | | |

| | | Mean RF | RF RSD | Note |
|---|---|---|---|---|
| | Reported: | **1.263739** | **4.1** | |
| | Calc'd: | **1.263739** | **4.1** | ***Match*** |

RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )
RSD Relative Sandard Deviation = 100% × STDev(RF) / (Mean RF)

**QC Element: Initial Calibration Verificaton (ICV)**

IS Internal Standard: Pentafluorobenzene

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Mean RF<br>[ICAL] | Response<br>(Analyte) | Conc.<br>[IS] | Response<br>[IS] | Conc.<br>(Reported) | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **ICV Sample: 16-Aug-2016 14:19:30** | | | | | | | | | |
| Chloroform | 50 | 0.880332 | 182581 | 50.000 | 204364 | **50.743** | **50.743**<br>***Match*** | **101** | **101**<br>***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS])

%R Percent Recovered = 100% × FOUND / TRUE

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8260B

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verification (CCV)

IS Internal Standard: Chlorobenzene-d5

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Conc. [STD] | Response (Analyte) | RF (Reported) | RF (Calc'd) | %D (Reported) | %D (Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **CCV Sample: 30-Aug-2016 19:30:30** | | | | | | | | | |
| **Tetrachloroethene** | | | | | | | | | |
| | 0.285799 | 50.00 | 288257 | 50 | 75396 | **0.261558** | **0.261558** ***Match*** | **-8.5** | **-8.5** ***Match*** |

%D Percent Difference = 100% × ( RF – Mean RF [ICAL] ) / ( Mean RF [ICAL] )
RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )

### QC Element: Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD)

| Analyte | LCS Spike Added | LCS Result | %Rec (Reported) | %Rec (Calc) | Note |
|---|---|---|---|---|---|
| Chloroform | 50 | 46 | **92** | **92** ***Match*** | ok (65 - 135) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8260B

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

MS/MSD Sample ID = CDL-DTW2-00-17116

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Ethylbenzene | ND (0) | 50 | 50.269 | **101** | **101** *Match* | ok (75 - 125) |

| | MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|---|
| | 50.256 | **101** | **101** *Match* | ok (75 - 125) |

| | RPD (Reported) | RPD (Calc) | Note |
|---|---|---|---|
| | **0.02** | **0.03** *~ Match* | ok (< 30) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

**Recalculation of Sample Results:**

IS Internal Standard: Pentafluorobenzene

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Dilution Factor | Response | Conc. (Reported) (µg/L) | Conc. (Calc'd) (µg/L) |
|---|---|---|---|---|---|---|---|
| **Lab Sample ID: RH24026-013 (CDL-PW21-00-002)** | | | | | | | |
| Carbon disulfide | 1.192082 | 50.00 | 154382 | 1 | 85513 | **23** | **23** *Match* |

Conc. (µg/L) = Dilution × ( Response × Conc. [IS] ) / ( Response [IS] × Mean RF [ICAL] )

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**Recalculation of Initial Calibration (ICAL) RFs, Mean RF, RSD:**

IS Internal Standard: Acenaphthene-d10

| Analyte | | Lvl#1 | Lvl#2 | Lvl#3 | Lvl#4 | Lvl#5 | Lvl#6 | Lvl#7 | Lvl#8 | Lvl#9 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Naphthalene** | | **ICAL - 7/19/2016** | | | | | | | | |
| | **Conc.: [STD]** | 0.2 | 1 | 2 | 5 | 10 | 15 | 20 | 25 | 30 |
| | **Response:** | 43183 | 256844 | 495417 | 1246733 | 2413332 | 4383655 | 5163074 | 6539517 | 8317141 |
| | **Conc. [IS]:** | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 | 20.00 |
| | **Response [IS]:** | 4169497 | 4420764 | 4323980 | 4378369 | 4190539 | 4992143 | 4442531 | 4547728 | 5448526 |
| | **Reported RF:** | **1.035688** | **1.161989** | **1.145743** | **1.138993** | **1.151800** | **1.170814** | **1.162192** | **1.150380** | **1.017663** |
| ***Match*** | **Calc'd RF:** | **1.035688** | **1.161989** | **1.145743** | **1.138993** | **1.151800** | **1.170814** | **1.162192** | **1.150380** | **1.017663** |

| | | Mean RF | RF RSD | Note |
|---|---|---|---|---|
| | **Reported:** | **1.126140** | **5.1** | |
| | **Calc'd:** | **1.126140** | **5.1** | ***Match*** |

RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )
RSD Relative Sandard Deviation = 100% × STDev(RF) / (Mean RF)

**QC Element: Initial Calibration Verificaton (ICV)**

IS Internal Standard: Acenaphthene-d10

| Lab Sample ID<br>Analyte | Conc.<br>TRUE | Mean RF<br>[ICAL] | Response<br>(Analyte) | Conc.<br>[IS] | Response<br>[IS] | Conc.<br>(Reported) | Conc.<br>(Calc'd) | %R<br>(Reported) | %R<br>(Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **Sample ICV: ICV1FV 01-Sep-2016 15:01:30** | | | | | | | | | |
| Fluorene | 5 | 1.501738 | 410324 | 20.000 | 1145964 | **4.7686** | **4.7686**<br>***Match*** | **95.4** | **95.4**<br>***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS]) × Final Vol / (Extracted Vol × Injected Vol)
%R Percent Recovered = 100% × FOUND / TRUE Final Vol = 1000 µL Extracted Vol = 1000 mL Injected Vol = 1 µL

## LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

### QC Element: Continuing Calibration Verification (CCV)

IS Internal Standard: 1,4-Dichlorobenzene-d4

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Conc. [STD] | Response | RF (Reported) | RF (Calc'd) | %D (Reported) | %D (Calc'd) |
|---|---|---|---|---|---|---|---|---|---|
| **CCV Sample: 01-Sep-2016 20:50:30** | | | | | | | | | |
| 1,4-Dichlorobenzene | 1.585683 | 20.00 | 624477 | 15 | 745059 | **1.59079** | **1.59079** ***Match*** | **0.3** | **0.3** ***Match*** |

%D Percent Difference = 100% × ( RF – Mean RF [ICAL] ) / ( Mean RF [ICAL] )
RF Response Factor = ( Response × Conc. [IS] / ( Response [IS] × Conc. [STD] )

### QC Element: Laboratory Control Sample (LCS) / Laboratory Control Sample Duplicate (LCSD)

| Analyte | LCS Spike Added | LCS Result | %Rec (Reported) | %Rec (Calc) | Note |
|---|---|---|---|---|---|
| Chrysene | 10 | 6.9 | **69** | **69** ***Match*** | ok (55 - 110) |

%Rec Percent Recovery = 100% × ( Result / Spike Added )

RQ20682-002

# LEVEL 4 DATA VALIDATION
## Recalculation / Verification of QC Elements and Sample Results
## Method: SW8270D

SDG #: RH24026 | Date: 11/12/17
Lab: SHEALY ENVIRONMENTAL SERVICES, INC. | Validated by: AB
Client: Wallops Flight Facility | Second Review by: LS

**Matrix:** Water

Concentrations are in micrograms per liter (µg/L) unless noted otherwise.

**QC Element: Matrix Spike (MS) / Matrix Spike Duplicate (MSD)**

MS/MSD Sample ID = RH24026-021

| Analyte | Sample Result | Spike Added | MS Result | MS %Rec (Reported) | MS %Rec (Calc) | Note |
|---|---|---|---|---|---|---|
| Diethylphthalate | 6.1 | 24 | 20.994 | **62** | **62** ***Match*** | ok (40 - 120) |

RH24026-021MS/MSD

| | Spike Added | MSD Result | MSD %Rec (Reported) | MSD %Rec (Calc) | Note |
|---|---|---|---|---|---|
| | 24 | 21.842 | **66** | **66** ***Match*** | ok (40 - 120) |

%Rec Percent Recovery
= 100% × ( Result / Spike Added )

RPD Relative Percent Difference
= 100% × ABS[Result1 - Result2] / AVG[Result1, Result2]

| RPD (Reported) | RPD (Calc) | Note |
|---|---|---|
| **4.0** | **4.0** ***Match*** | ok (< 30) |

QAPP (9/2015), p.36

**Recalculation of Sample Results:**

IS Internal Standard: Acenaphthene-d10 | Calib: 9/1/2016 6:22 PM

| Analyte | Mean RF [ICAL] | Conc. [IS] | Response [IS] | Dilution | Extracted Volume (mL) | Final Volume (µL) | Response (pdf-pg) | Conc. (Reported) (µg/L) | Conc. (Calc'd) (µg/L) |
|---|---|---|---|---|---|---|---|---|---|
| **Lab Sample ID: RH24026-011 (CDL-RBPW3-02-082516)** | | | | | | | | | |
| Diethylphthalate | 1.604613 | 20.00 | 1202234 | 1 | 1000 | 1000 | 688940 | **7.1425** | **7.1425** ***Match*** |

Conc. = (Response / Mean RF [ICAL]) × (Conc. [IS] / Response [IS]) × Final Vol / (Extracted Vol × Injected Vol)

Injected Vol = 1 µL

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| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q3 |
| SDG: | 9696_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | James Parker, Senior Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RBPW1-02-082216 | 9696007 | Water | Equipment Blank/EB | X |
| CDL-RBPW2-02-082416 | 9696012 | Water | Equipment Blank/EB | X |
| CDL-RBPW3-02-082516 | 9696001 | Water | Equipment Blank/EB | X |
| CDL-RBPW4-02-082616 | 9696003 | Water | Equipment Blank/EB | X |
| CDL-RBPW5-02-082916 | 9696005 | Water | Equipment Blank/EB | X |
| CDL-RBPW6-02-083016 | 9696020 | Water | Equipment Blank/EB | X |
| CDL-PW14-01-002 | 9696009 | Water | Field Duplicate/FD | X |
| CDL-PW11-00-002 | 9696013 | Water | Field Sample/N | X |
| CDL-PW12-00-002 | 9696006 | Water | Field Sample/N | X |
| CDL-PW13-00-002 | 9696011 | Water | Field Sample/N | X |
| CDL-PW14-00-002 | 9696008 | Water | Field Sample/N | X |
| CDL-PW15-00-002 | 9696010 | Water | Field Sample/N | X |
| CDL-PW16-00-002 | 9696017 | Water | Field Sample/N | X |
| CDL-PW16-01-002 | 9696018 | Water | Field Sample/N | X |
| CDL-PW17-00-002 | 9696019 | Water | Field Sample/N | X |
| CDL-PW18-00-002 | 9696021 | Water | Field Sample/N | X |
| CDL-PW18-01-002 | 9696022 | Water | Field Sample/N | X |
| CDL-PW19-00-002 | 9696004 | Water | Field Sample/N | X |
| CDL-PW20-00-002 | 9696016 | Water | Field Sample/N | X |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-PW21-00-002 | 9696002 | Water | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 9696_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

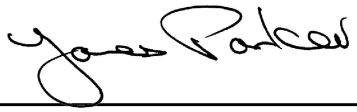
- Blank
- Blank - Negative
- Equipment Blank
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 340 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

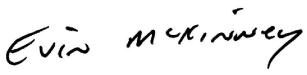
| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | No additional comments; see Checklist for detail. |



November 17, 2017

Reviewed by James Parker, Senior Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Qualified Results

No results associated with this sample delivery group required qualification.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised above project limits in association with undiluted analyses that reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | 9696 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were all standards analyzed at the appropriate concentrations? | **Yes** |
| Were all samples associated with an acceptable initial calibration? | **Yes** |
| Were five RRF RSD's ≤ 35%? | **Yes** |
| Were five RRF RSD's ≤ 25%? | **Yes** |
| Were the GC resolution criteria are met [Percent Valley (% Valley) ≤25% | **Yes** |
| Were recalculations performed on a representative sample of the RRFs? | **Yes** |
| Were recalculations performed on a representative sample of the %RSDs? | **Yes** |

List any samples which did not meet the specified criteria below, and describe reasons for qualification in Comment section.

**CALCULATIONS**

RRF Standard ID: CS3 UD141224-05 CS3742 Calibration ID: CFA_1613_A06NOV15.mdb

Compound ID: 123478-$H_X$CDF Compound ID: 123678-$H_X$CDD

Reported Result: 1.142 pg. 681 %RSD: 1.84320 page 679

Average RRF = 0.997225

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

| | | | | | |
|---|---|---|---|---|---|
| Compound Area = | 1690000 | page 731 | RF Level 1 = | 0.998 | RF Level 6 = 0.986 |
| I.S. Area = | 2960000 | page 731 | RF Level 2 = | 1.031 | RF Level 7 = |
| Compound Conc. = | 50.00 | page 681 | RF Level 3 = | 0.986 | RF Level 8 = |
| I.S. Conc. = | 100 | | RF Level 4 = | 1.002 | RF Level 9 = |
| | | | RF Level 5 = | 0.981 | |

RRF = 1.142

Matches

Standard Deviation = 0.018

Average RRF = 0.997 Matches

%RSD = 1.838 Close Match (rounding)

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | 9696 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were all samples associated with an acceptable continuing calibration? | **Yes** |
| Were all RRF %D values ≤ 35%? | **Yes** |
| Were recalculations performed on a representative sample of the RRFs? | **Yes** |
| Were recalculations performed on a representative sample of the %Ds? | **Yes** |

List any samples which did not meet the specified criteria below, and describe reasons for qualification in Comment section. **Include +/- notation to denote bias of %D outliers.**

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| RRF Standard ID: | A16SEP16C-11 9/16/2016 20:43 | | %D Standard ID: | A16SEP16C-11 9/16/2016 20:43 | |
| Compound ID: | 123478-$H_X$CDF | | Compound ID: | 123789-$H_X$CDD | |
| Reported Result: | 1.144 | page 800 | Reported %D: | 7.8% | page 800 |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}} \qquad \%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

| | | | | | |
|---|---|---|---|---|---|
| Compound Area = | 1290000 | page 800 | Average RRF = | 0.978189 | page 679 |
| I.S. Area = | 2260000 | page 800 | CCV RRF = | 1.055000 | page 800 |
| Compound Conc. = | 50 | page 800 | | | |
| I.S. Conc. = | 100 | | %D = | -7.85 | Close Match (rounding) |
| CCV RRF = | 1.142 | Matches | %D Indicating Bias = | 7.9 | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | 9696 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

Were all surrogate recoveries within the specified criteria (65-135%)? **Yes**
Were recalculations performed on a representative sample of the results? **Yes**

List any samples which did not have acceptable surrogate recoveries.

Any non-detect result associated with a surrogate recovery below 10% should be rejected.

**CALCULATIONS**

Sample ID: CDL-PW18-01-002
Compound ID: 13C-OCDD
Reported Result: 47.0% page 72

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 2220 page 62
Surr. Spike Conc. = 4730

% Recovery = 46.9 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

| | | | |
|---|---|---|---|
| SDG #: | 9696 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were MS/MSD samples analyzed at the proper frequency? | **Yes** |
| Were all spike recoveries and RPD values within the established criteria? | **No** |
| Were recalculations performed on a representative sample of the results? | **Yes** |
| If no, list outliers below. (see outlier report) | |

### CALCULATIONS

| | | | |
|---|---|---|---|
| Sample ID: | CDL-PW11-00-002 MS | Sample ID: | CDL-SD20-00-001 MS/MSD |
| Compound ID: | 1,2,3,4,6,7,8,9-OCDF | Compound ID: | 1,2,3,6,7,8-HxCDF |
| Recovery: | 130.0% page 76 | RPD: | 8.19 page 77 |

$$\%\ \text{Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

| | | | | | |
|---|---|---|---|---|---|
| Conc. MS = | 2670.00 | page 629 | MS Conc. = | 1070.00 | page 629 |
| Unspiked Samp. = | 0.0 | page 31 | MSD Conc. = | 1170.00 | page 643 |
| MS Spike Conc. = | 2050.0 | page 76 | | | |
| | | | RPD = | 8.93 | |
| % Recovery = | 130.2 | Matches | | | |
| | | | | Close Match (rounding) | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

SDG #: 9696
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: JP
Second Review by: EM

| | |
|---|---|
| Were laboratory control samples analyzed at the proper frequency? | **Yes** |
| Were all spike recoveries and RPD values within the established criteria? | **Yes** |
| Were recalculations performed on a representative sample of the results? | **Yes** |

If no, list outliers below. (see outlier report)

**CALCULATIONS**

Sample ID: LCS for batch 32772
Compound ID: 1,2,3,6,7,8-HxCDD
Recovery: 91% page 74

% Recovery = Conc. LCS / LCS Spike Conc. X 100

Conc. LCS = 911.00
LCS Spike Conc. = 1000.00

% Recovery = 91 Matches

Sample ID: LCS/LCSD for batch 32772
Compound ID: 1,2,3,6,7,8-HxCDD
RPD: 11%

RPD = |LCS Conc. - LCSD Conc.| / (LCS Conc. + LCSD Conc.)/2 X 100

LCS Conc. = 45.54 page 602
LCSD Conc. = 50.65 page 616

RPD = 10.6
Close Match, rounding

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 9696 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were recalculations performed on at least 10% of positive results? | **Yes** |
| Did all raw data agree with the final reported results? | **Yes** |
| Were positive hits verified by acceptable mass spectra? | **Yes** |
| Were all retention times within 0.06 RRT units of the daily standard? | **Yes** |

**CALCULATIONS**

Sample ID: CDL-PW16-01-002 (9696018)
Compound ID: 1,2,3,4,6,7,8,9-OCDD
Reported Result: 105 pg/L page 54

Conc. In Sample = $\frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \text{Dilution Factor}$

| | | Units | |
|---|---|---|---|
| Area Sample = | 35200 | Area | page 462 |
| Area I.S. = | 1350000 | Area | page 462 |
| Conc. I.S. = | 100 | | |
| Average RRF = | 0.999393 | NA | page 679 |
| Final Volume = | 40.0 | uL | page 616 |
| Initial Amount = | 996.4 | ml | page 616 |
| Dilution Factor = | 1.0 | NA | page 54 |
| % Solids = | 100.0% | | |
| Conc. In Sample = | 104.74 | | |
| | Match | | |

Comments

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q3 |
| SDG: | RH24027 |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | Shealy Labs, Inc., West Columbia, SC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | Gretchen Gotlieb, Data Review Chemist |
| Second Reviewer: | Leticia Sangalang, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | SW6010C | SW7470A | SW7471B | SW8260B | SW8270D |
|---|---|---|---|---|---|---|---|---|
| CDL-RBSD1-02-082216 | RH24027-002 | Water | Equipment Blank/EB | X | X | | X | X |
| CDL-SD11-00-001 | RH24027-007 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD12-00-001 | RH24027-001 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD13-00-001 | RH24027-006 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD14-00-001 | RH24027-004 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD15-00-001 | RH24027-005 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD16-00-001 | RH24027-011 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD16-01-001 | RH24027-012 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD17-00-001 | RH24027-013 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD17-01-001 | RH24027-014 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD18-00-001 | RH24027-015 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD18-01-001 | RH24027-016 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD19-00-001 | RH24027-010 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD20-00-001 | RH24027-008 | Solid | Field Sample/N | X | | X | X | X |
| CDL-SD21-00-001 | RH24027-009 | Solid | Field Sample/N | X | | X | X | X |
| CDL-TB1-03-082216 | RH24027-003 | Water | Trip Blank/TB | | | | X | |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by Shealy Labs, Inc., West Columbia, SC and were reported under sample delivery group (SDG) RH24027. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Equipment Blank
- Lab Replicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time
- Trip Blank

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 155 results (7.59%) out of the 2042 results (sample and field QC samples) reported are qualified based on review and 10 results (0.49%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

| Analytical Method | Data Reviewer Comment |
|---|---|
| SW6010C | The lab noted the following:<br><br>Sample -015 required re-analysis multiple times. There was insufficient sample to make the serial dilution and the post digestion spike aliquots for this sample in the third analysis. Beryllium is reported from the third analysis.<br><br>The MS/MSD recoveries in batches 20672, 21130 and 21759 were outside acceptance criteria. All other QC criteria for the batch were within acceptance criteria and method control limits. The MS/MSD recovery results are attributed to matrix interference. The associated sample results were reported and no corrective action was required. |
| SW7470A | No additional comments; see Checklist for detail. |
| SW7471B | No additional comments; see Checklist for detail. |
| SW8260B | The lab narrated the following:<br><br>The ICV associated with samples -002 and -003 recovered high for DCDFM (123%). Both samples were ND for this compound.<br><br>Sample -009 failed internal standard recovery criteria due to matrix interference; result are confirmed by repeat analysis.<br><br>The ICV associated with the calibration used to analyze the sample -004, -005, -006, -007, -008 and -010 failed high for Dichlorodifluoromethane (122%) and 1,4-dioxane (125%); all samples were ND for these two compounds.<br><br>The MS/MSD recoveries in batches 20963 and 21117 were outside acceptance criteria. All other QC criteria for the batch were within acceptance criteria and method control limits. The MS/MSD recovery results are attributed to matrix interference. The associated sample results were reported and no corrective action was required. |
| SW8270D | The lab noted the following:<br><br>The LCS associated with sample -002 failed low for 3,3-Dichlorobenzidine. The sample is re-extracted and re-analyzed within hold and LCS still failed for 3,3-Dichlorobenzidine. No sample remained for third extraction.<br><br>The LCS associated with samples -011 through -014 fails low for Dibenzo(a,h)anthracene. Samples are re-extracted outside the holding with LCS passing. All runs are reported. The closing CCV failed low for Hexachlorocyclopentadiene due to matrix.<br><br>ICV associated with sample -002 had a recovery for 2,4-dinitophenol at 75% which is below DOD limits of 80-120%; All other compounds were within limits.<br><br>The MS/MSD recoveries in batches 21013 and 21092 were outside acceptance criteria. All other QC criteria for the batch were within acceptance criteria and method control limits. The MS/MSD recovery results are attributed to matrix interference. The associated sample results were reported and no corrective action was required. |

November 16, 2017

Reviewed by Gretchen Gotlieb, Data Review Chemist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

November 29, 2017

Reviewed by Leticia Sangalang, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method SW6010C, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ20672-001 (LB)/ RQ20672-001 | Chromium | 0.1100 | < 0.072 | < 0.5 | mg/kg | U/None | L | |
| RQ20672-001 (LB)/ RQ20672-001 | Aluminum | 11.00 | < 6.7 | < 50 | mg/kg | U/None | L | |
| RQ21759-001 (LB)/ RQ21759-001 | Zinc | 1.000 | < 0.43 | < 2.5 | mg/kg | U/None | L | |
| RQ21759-001 (LB)/ RQ21759-001 | Iron | 2.400 | < 2.3 | < 5 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Iron | -222.2 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Cadmium | 64.29 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Zinc | 64.81 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Selenium | 68.57 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Nickel | 68.89 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Chromium | 70.43 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Silver | 70.71 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Vanadium | 71.48 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Arsenic | 72.03 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Copper | 74.44 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Barium | 74.93 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Sodium | 127.3 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Antimony | 27.14 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Magnesium | 36.36 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Manganese | 55.56 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Thallium | 67.27 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Lead | 67.97 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Cobalt | 71.45 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (SD)/ RH24027-001MD | Calcium | 72.73 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Iron | -250.0 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Zinc | 64.58 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Cadmium | 68.33 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Nickel | 69.17 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Vanadium | 72.08 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Selenium | 72.50 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Chromium | 73.90 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Sodium | 148.9 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Antimony | 24.17 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Magnesium | 42.55 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Manganese | 50.00 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Thallium | 70.21 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Cobalt | 72.05 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD12-00-001 (MS)/ RH24027-001MS | Lead | 72.71 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Iron | 281.3 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Aluminum | 468.8 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Cadmium | 74.97 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Magnesium | 125.4 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Antimony | 35.63 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Thallium | 74.62 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Sodium | 127.0 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-SD18-00-001 (SD)/ RH24027-015MD | Potassium | 133.3 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Iron | 238.1 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Aluminum | 476.2 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Cadmium | 69.96 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Antimony | 23.64 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Thallium | 69.41 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Cobalt | 73.76 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Lead | 74.72 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD18-00-001 (MS)/ RH24027-015MS | Potassium | 125.6 | 75 - 125 | 30 - 125 | percent | J/None | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Iron | -250.0 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Aluminum | 200.0 | 75 - 125 | 30 - 125 | percent | J/None | M | Spike amount Insignificant |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Zinc | 65.50 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Nickel | 67.00 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Silver | 69.70 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Vanadium | 71.50 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Cadmium | 71.72 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Selenium | 71.72 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Arsenic | 72.00 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Chromium | 72.20 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Barium | 72.67 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Sodium | -325.0 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Magnesium | 0.000 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Antimony | 14.14 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Manganese | 45.00 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Calcium | 52.50 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Thallium | 64.56 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Cobalt | 66.05 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Lead | 67.40 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (SD)/ RH24027-010MD | Potassium | 72.50 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Iron | -428.6 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Aluminum | -95.24 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Zinc | 67.14 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

**Quality Control Outliers for test method SW6010C, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Vanadium | 72.86 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Nickel | 73.33 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Silver | 74.55 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Sodium | -186.0 | 75 - 125 | 30 - 125 | percent | J/R | M | Spike amount Insignificant |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Magnesium | -23.26 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Antimony | 21.82 | 75 - 125 | 30 - 125 | percent | J/R | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Manganese | 38.10 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Calcium | 55.81 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Potassium | 58.14 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Thallium | 70.93 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |
| CDL-SD19-00-001 (MS)/ RH24027-010MS | Lead | 73.52 | 75 - 125 | 30 - 125 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD12-00-001 | N | Cadmium | 0.670 | 0.270 S U | 0.270 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Chromium | 1.30 | 54.0 BS | 54.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Copper | 1.30 | 19.0 S | 19.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Selenium | 2.70 | 2.20 S U | 2.20 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Vanadium | 6.70 | 67.0 S | 67.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Zinc | 6.70 | 85.0 S | 85.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Antimony | 2.70 | 2.00 S U | 2.00 R | - | mg/kg | M |
| CDL-SD12-00-001 | N | Arsenic | 2.00 | 13.0 S | 13.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Barium | 3.50 | 54.0 S | 54.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Calcium | 670 | 3200 S | 3200 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Cobalt | 3.50 | 7.30 S | 7.30 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Lead | 1.30 | 21.0 S | 21.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Nickel | 5.40 | 24.0 S | 24.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Silver | 1.30 | 0.650 S U | 0.650 UJ | - | mg/kg | M |

**Qualified Results associated with the MS Recovery for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD12-00-001 | N | Thallium | 6.70 | 3.40 S U | 3.40 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Magnesium | 670 | 11000 S | 11000 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Manganese | 2.00 | 230 S | 230 J | - | mg/kg | M |
| CDL-SD18-00-001 | N | Cadmium | 0.500 | 0.160 JS | 0.160 J | - | mg/kg | M/D/TR |
| CDL-SD18-00-001 | N | Antimony | 2.00 | 1.50 S U | 1.50 R | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Cobalt | 2.60 | 5.40 S | 5.40 J | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Lead | 1.00 | 14.0 S | 14.0 J | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Thallium | 5.00 | 2.50 S U | 2.50 UJ | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Magnesium | 500 | 8100 S | 8100 J | + | mg/kg | M |
| CDL-SD18-00-001 | N | Sodium | 500 | 21000 | 21000 J | + | mg/kg | M |
| CDL-SD18-00-001 | N | Potassium | 500 | 4600 S | 4600 J | + | mg/kg | M |
| CDL-SD18-01-001 | N | Cadmium | 0.600 | 0.170 J | 0.170 J | - | mg/kg | M/D/TR |
| CDL-SD18-01-001 | N | Antimony | 2.40 | 1.80 U | 1.80 R | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Cobalt | 3.10 | 6.00 | 6.00 J | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Lead | 1.20 | 16.0 | 16.0 J | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Thallium | 6.00 | 3.00 U | 3.00 UJ | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Magnesium | 600 | 9300 | 9300 J | + | mg/kg | M |
| CDL-SD18-01-001 | N | Sodium | 600 | 24000 | 24000 J | + | mg/kg | M |
| CDL-SD18-01-001 | N | Potassium | 600 | 5100 | 5100 J | + | mg/kg | M |
| CDL-SD19-00-001 | N | Cadmium | 0.760 | 0.300 S U | 0.300 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Chromium | 1.50 | 59.0 S | 59.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Selenium | 3.10 | 2.50 S U | 2.50 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Vanadium | 7.60 | 77.0 S | 77.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Zinc | 7.60 | 89.0 S | 89.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Antimony | 3.10 | 2.30 S U | 2.30 R | - | mg/kg | M/D |
| CDL-SD19-00-001 | N | Arsenic | 2.30 | 20.0 S | 20.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Barium | 4.00 | 62.0 S | 62.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Calcium | 760 | 4100 S | 4100 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Cobalt | 4.00 | 7.70 S | 7.70 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Lead | 1.50 | 23.0 S | 23.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Nickel | 6.10 | 26.0 S | 26.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Silver | 1.50 | 0.750 S U | 0.750 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Thallium | 7.60 | 3.80 S U | 3.80 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Magnesium | 760 | 13000 S | 13000 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Manganese | 2.30 | 290 S | 290 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Potassium | 760 | 7100 S | 7100 J | - | mg/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH24027-010MD (SD)/ RH24027-010MD | Antimony | 52.63 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Zinc | 38.60 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Vanadium | 40.00 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Nickel | 43.48 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Cadmium | 43.65 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Silver | 44.13 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Selenium | 44.13 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Copper | 44.90 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Arsenic | 45.05 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Chromium | 45.38 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Lead | 46.73 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Barium | 46.91 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Cobalt | 47.62 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Thallium | 48.72 | < 30 | < 30 | rpd | J/UJ | D | |
| RH24027-015MD (SD)/ RH24027-015MD | Antimony | 74.70 | < 30 | < 30 | rpd | J/UJ | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS RPD for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD18-00-001 | N | Antimony | 2.00 | 1.50 S U | 1.50 R | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Arsenic | 1.50 | 7.60 S | 7.60 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Barium | 2.60 | 40.0 | 40.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Cadmium | 0.500 | 0.160 JS | 0.160 J | - | mg/kg | M/D/TR |
| CDL-SD18-00-001 | N | Chromium | 1.00 | 37.0 S | 37.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Cobalt | 2.60 | 5.40 S | 5.40 J | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Copper | 1.00 | 14.0 | 14.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Lead | 1.00 | 14.0 S | 14.0 J | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Nickel | 4.00 | 17.0 S | 17.0 J | | mg/kg | D |

**Qualified Results associated with the MS RPD for SW6010C**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD18-00-001 | N | Selenium | 2.00 | 1.60 U | 1.60 UJ | | mg/kg | D |
| CDL-SD18-00-001 | N | Silver | 1.00 | 0.500 S U | 0.500 UJ | | mg/kg | D |
| CDL-SD18-00-001 | N | Thallium | 5.00 | 2.50 S U | 2.50 UJ | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Vanadium | 5.00 | 42.0 | 42.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Zinc | 5.00 | 63.0 BS | 63.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Antimony | 2.40 | 1.80 U | 1.80 R | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Arsenic | 1.80 | 8.10 | 8.10 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Barium | 3.10 | 44.0 | 44.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Cadmium | 0.600 | 0.170 J | 0.170 J | - | mg/kg | M/D/TR |
| CDL-SD18-01-001 | N | Chromium | 1.20 | 41.0 | 41.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Cobalt | 3.10 | 6.00 | 6.00 J | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Copper | 1.20 | 15.0 | 15.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Lead | 1.20 | 16.0 | 16.0 J | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Nickel | 4.80 | 19.0 | 19.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Selenium | 2.40 | 1.90 U | 1.90 UJ | | mg/kg | D |
| CDL-SD18-01-001 | N | Silver | 1.20 | 0.600 U | 0.600 UJ | | mg/kg | D |
| CDL-SD18-01-001 | N | Thallium | 6.00 | 3.00 U | 3.00 UJ | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Vanadium | 6.00 | 46.0 | 46.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Zinc | 6.00 | 71.0 B | 71.0 J | | mg/kg | D |
| CDL-SD19-00-001 | N | Antimony | 3.10 | 2.30 S U | 2.30 R | - | mg/kg | M/D |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW6010C, Total, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBSD1-02-082216 (EB)/ RH24027-002 | Sodium | 1.200 | < 0.33 | < 5 | mg/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW7471B, Total, Blank**

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ20932-001 (LB)/ RQ20932-001 | Mercury | 0.01600 | < 0.0063 | < 0.083 | mg/kg | U/None | L | |
| RQ20979-001 (LB)/ RQ20979-001 | Mercury | 0.007200 | < 0.0063 | < 0.083 | mg/kg | U/None | L | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Blank for SW7471B, Total**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD11-00-001 | N | Mercury | 0.420 | 0.110 BJ | 0.420 U | + | mg/kg | L |
| CDL-SD12-00-001 | N | Mercury | 0.310 | 0.110 BJ | 0.310 U | + | mg/kg | L |
| CDL-SD13-00-001 | N | Mercury | 0.310 | 0.130 BJ | 0.310 U | + | mg/kg | L |
| CDL-SD14-00-001 | N | Mercury | 0.290 | 0.130 BJ | 0.290 U | + | mg/kg | L |
| CDL-SD15-00-001 | N | Mercury | 0.220 | 0.0710 BJ | 0.220 U | + | mg/kg | L |
| CDL-SD19-00-001 | N | Mercury | 0.290 | 0.0870 BJ | 0.290 U | + | mg/kg | L |
| CDL-SD20-00-001 | N | Mercury | 0.170 | 0.0830 BJ | 0.170 U | + | mg/kg | L |
| CDL-SD21-00-001 | N | Mercury | 0.320 | 0.0650 BJ | 0.320 U | + | mg/kg | L |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBSD1-02-082216 (EB)/ RH24027-002 | Acetone | 2.200 | < 2 | < 20 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,2-Dichlorobenzene | 131.0 | 75 - 120 | 20 - 120 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,4-Dichlorobenzene | 137.9 | 70 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,2-Dichloroethane | 137.9 | 70 - 135 | 20 - 135 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,1,2-Trichloroethane | 141.4 | 60 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Toluene | 141.4 | 70 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,3-Dichlorobenzene | 141.4 | 70 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Chlorobenzene | 141.4 | 75 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Chloromethane | 144.8 | 50 - 130 | 20 - 130 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | cis-1,2-Dichloroethene | 144.8 | 65 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,2-Dichloropropane | 144.8 | 70 - 120 | 20 - 120 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Chloroform | 144.8 | 70 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Benzene | 144.8 | 75 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Trichloroethene (TCE) | 144.8 | 75 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Methylene chloride | 148.3 | 55 - 140 | 20 - 140 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | trans-1,2-Dichloroethene | 148.3 | 65 - 135 | 20 - 135 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Cyclohexane | 151.7 | 50 - 150 | 20 - 150 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Vinyl chloride | 151.7 | 60 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,1,1-Trichloroethane | 151.7 | 70 - 135 | 20 - 135 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Ethylbenzene | 151.7 | 75 - 125 | 20 - 125 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,1,2,2-Tetrachloroethane | 158.6 | 55 - 130 | 20 - 130 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,1-Dichloroethene | 158.6 | 65 - 135 | 20 - 135 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Tetrachloroethene (PCE) | 158.6 | 65 - 140 | 20 - 140 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Acetone | 162.1 | 20 - 160 | 20 - 160 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | 1,1,2-Trichloro-1,2,2-trifluoroethane | 162.1 | 50 - 150 | 20 - 150 | percent | J/None | M | |

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Dichlorodifluoromethane | 165.5 | 35 - 135 | 20 - 135 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Isopropylbenzene (Cumene) | 182.8 | 75 - 130 | 20 - 130 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | Methyl acetate | 210.3 | 50 - 150 | 20 - 150 | percent | J/None | M | |
| CDL-SD16-01-001 (MS)/ RH24027-012MS | cis-1,3-Dichloropropene | 65.52 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | trans-1,3-Dichloropropene | 0.000 | 65 - 125 | 20 - 125 | percent | J/R | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | cis-1,3-Dichloropropene | 0.000 | 70 - 125 | 20 - 125 | percent | J/R | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Styrene | 14.12 | 75 - 125 | 20 - 125 | percent | J/R | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Bromomethane | 17.06 | 30 - 160 | 20 - 160 | percent | J/R | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | 1,2,4-Trichlorobenzene | 25.29 | 65 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | 1,2-Dibromoethane (EDB) | 43.53 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Carbon tetrachloride | 45.88 | 65 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Bromoform | 46.47 | 55 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | 1,2-Dichlorobenzene | 57.06 | 75 - 120 | 20 - 120 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Dibromochloromethane | 58.82 | 65 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | 1,4-Dichlorobenzene | 58.82 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | trans-1,2-Dichloroethene | 64.71 | 65 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Toluene | 64.71 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | 1,3-Dichlorobenzene | 64.71 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Bromodichloromethane | 64.71 | 70 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Benzene | 64.71 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Chlorobenzene | 64.71 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Trichloroethene (TCE) | 64.71 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Ethylbenzene | 70.59 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | trans-1,3-Dichloropropene | 0.000 | 65 - 125 | 20 - 125 | percent | J/R | M | |

**Quality Control Outliers for test method SW8260B, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD20-00-001 (MS)/ RH24027-008MS | cis-1,3-Dichloropropene | 0.000 | 70 - 125 | 20 - 125 | percent | J/R | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Bromomethane | 16.43 | 30 - 160 | 20 - 160 | percent | J/R | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Styrene | 20.71 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | 1,2,4-Trichlorobenzene | 28.57 | 65 - 130 | 20 - 130 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | 1,2-Dibromoethane (EDB) | 48.57 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Carbon tetrachloride | 49.29 | 65 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Bromoform | 50.71 | 55 - 135 | 20 - 135 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | 1,2-Dichlorobenzene | 63.57 | 75 - 120 | 20 - 120 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | 1,4-Dichlorobenzene | 68.57 | 70 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Benzene | 71.43 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Trichloroethene (TCE) | 71.43 | 75 - 125 | 20 - 125 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD16-00-001 | N | cis-1,3-Dichloropropene | 29.0 | 23.0 U | 23.0 UJ | - | ug/kg | M |
| CDL-SD16-00-001 | N | Acetone | 120 | 120 | 120 J | + | ug/kg | M |
| CDL-SD16-01-001 | N | cis-1,3-Dichloropropene | 34.0 | 27.0 S U | 27.0 UJ | - | ug/kg | M |
| CDL-SD16-01-001 | N | Acetone | 140 | 160 S | 160 J | + | ug/kg | M |
| CDL-SD20-00-001 | N | 1,2,4-Trichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,2-Dibromoethane (EDB) | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Bromodichloromethane | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Bromoform | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Carbon tetrachloride | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Dibromochloromethane | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Styrene | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | Bromomethane | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | cis-1,3-Dichloropropene | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |

**Qualified Results associated with the MS Recovery for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD20-00-001 | N | trans-1,3-Dichloropropene | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,2-Dichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,3-Dichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,4-Dichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Benzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Chlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Ethylbenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Toluene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | trans-1,2-Dichloroethene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Trichloroethene (TCE) | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8260B, Surrogate**

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD13-00-001 (N)/ RH24027-006 | 1-Bromo-4-fluorobenzene (4-Bromofluorobenzene) | 78.79 | 79 - 119 | 10 - 119 | percent | J/UJ | I | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD13-00-001 | N | 1,1,1-Trichloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1,2,2-Tetrachloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1,2-Trichloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1-Dichloroethene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2,4-Trichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dibromo-3-chloropropane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dibromoethane (EDB) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dichloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dichloropropane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,3-Dichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,4-Dichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 2-Butanone (MEK) | 67.0 | 69.0 | 69.0 J | - | ug/kg | I |
| CDL-SD13-00-001 | N | 2-Hexanone | 67.0 | 54.0 U | 54.0 UJ | - | ug/kg | I |

**Qualified Results associated with the Surrogate for SW8260B**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD13-00-001 | N | 4-Methyl-2-pentanone (MIBK) | 67.0 | 54.0 U | 54.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Acetone | 130 | 330 | 330 J | - | ug/kg | I |
| CDL-SD13-00-001 | N | Benzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Bromodichloromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Bromoform | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Bromomethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Carbon disulfide | 33.0 | 34.0 | 34.0 J | - | ug/kg | I |
| CDL-SD13-00-001 | N | Carbon tetrachloride | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chloroform | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chloromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | cis-1,2-Dichloroethene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | cis-1,3-Dichloropropene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Cyclohexane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Dibromochloromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Dichlorodifluoromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Ethylbenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Isopropylbenzene (Cumene) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methyl acetate | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methyl tert-butyl ether (MTBE) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methylcyclohexane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methylene chloride | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Styrene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Tetrachloroethene (PCE) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Toluene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | trans-1,2-Dichloroethene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | trans-1,3-Dichloropropene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Trichloroethene (TCE) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Trichlorofluoromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Vinyl chloride | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Xylenes, Total | 33.0 | 53.0 U | 53.0 UJ | - | ug/kg | I |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, Equipment Blank**

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-RBSD1-02-082216 (EB)/ RH24027-002 | 4-Chloro-3-methylphenol | 0.8900 | < 0.26 | < 1 | ug/l | U/None | V | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ21092-002 (BS)/ RQ21092-002 | 4-Chloroaniline | 102.0 | 10 - 95 | 10 - 95 | percent | J/None | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Quality Control Outliers for test method SW8270D, LCS Recovery**

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RQ20682-002 (BS)/ RQ20682-002 | 3,3'-Dichlorobenzidine | 0.000 | 20 - 110 | 20 - 110 | percent | J/UJ | C | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the LCS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-RBSD1-02-082216 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD16-00-001 (SD)/ RH24027-011MD | Hexachlorocyclopentadiene | 0.000 | 20 - 134 | 10 - 134 | percent | J/R | M | |
| CDL-SD16-00-001 (SD)/ RH24027-011MD | Hexachloroethane | 23.73 | 35 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-SD16-00-001 (SD)/ RH24027-011MD | Dibenz (a,h)anthracene | 33.90 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-SD16-00-001 (MS)/ RH24027-011MS | 2,4-Dichlorophenol | 160.3 | 45 - 110 | 10 - 110 | percent | J/None | M | |
| CDL-SD16-00-001 (MS)/ RH24027-011MS | Hexachlorocyclopentadiene | 0.000 | 20 - 134 | 10 - 134 | percent | J/R | M | |
| CDL-SD16-00-001 (MS)/ RH24027-011MS | Hexachloroethane | 24.14 | 35 - 110 | 10 - 110 | percent | J/UJ | M | |
| CDL-SD16-00-001 (MS)/ RH24027-011MS | Dibenz (a,h)anthracene | 36.21 | 40 - 125 | 10 - 125 | percent | J/UJ | M | |
| CDL-SD20-00-001 (SD)/ RH24027-008MD | Hexachlorocyclopentadiene | 11.05 | 20 - 134 | 10 - 134 | percent | J/UJ | M | |
| CDL-SD20-00-001 (MS)/ RH24027-008MS | Hexachlorocyclopentadiene | 11.58 | 20 - 134 | 10 - 134 | percent | J/UJ | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for SW8270D**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD16-00-001 | N | Dibenz(a,h)anthracene | 1200 | 60.0 LS U | 60.0 UJ | - | ug/kg | M |
| CDL-SD16-00-001 | N | Hexachloroethane | 1200 | 490 S U | 490 UJ | - | ug/kg | M |
| CDL-SD16-00-001 | N | Hexachlorocyclopentadiene | 3000 | 2400 S U | 2400 R | - | ug/kg | M |
| CDL-SD16-01-001 | N | Dibenz(a,h)anthracene | 1200 | 60.0 L U | 60.0 UJ | - | ug/kg | M |
| CDL-SD16-01-001 | N | Hexachloroethane | 1200 | 490 U | 490 UJ | - | ug/kg | M |
| CDL-SD16-01-001 | N | Hexachlorocyclopentadiene | 3000 | 2400 U | 2400 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | Hexachlorocyclopentadiene | 1900 | 1500 S U | 1500 UJ | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Quality Control Outliers for test method SW8270D, MS RPD**

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| RH24027-008MD (SD)/ RH24027-008MD | Pentachlorophenol | 30.30 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-008MD (SD)/ RH24027-008MD | 2,4-Dinitrophenol | 32.56 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-008MD (SD)/ RH24027-008MD | 4,6-Dinitro-2-methylphenol | 33.33 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-008MD (SD)/ RH24027-008MD | Dibenz (a,h)anthracene | 36.07 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-008MD (SD)/ RH24027-008MD | Indeno(1,2,3-c,d)pyrene | 36.07 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-008MD (SD)/ RH24027-008MD | 4-Chloroaniline | 40.00 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-008MD (SD)/ RH24027-008MD | Benzo (g,h,i)perylene | 42.42 | < 30 | < 30 | rpd | J/None | D | |
| RH24027-011MD (SD)/ RH24027-011MD | 4-Chloroaniline | 30.59 | < 30 | < 30 | rpd | J/None | D | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD12-00-001 | N | Cadmium | 0.670 | 0.270 S U | 0.270 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Chromium | 1.30 | 54.0 BS | 54.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Copper | 1.30 | 19.0 S | 19.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Selenium | 2.70 | 2.20 S U | 2.20 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Vanadium | 6.70 | 67.0 S | 67.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Zinc | 6.70 | 85.0 S | 85.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Antimony | 2.70 | 2.00 S U | 2.00 R | - | mg/kg | M |
| CDL-SD12-00-001 | N | Arsenic | 2.00 | 13.0 S | 13.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Barium | 3.50 | 54.0 S | 54.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Calcium | 670 | 3200 S | 3200 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Cobalt | 3.50 | 7.30 S | 7.30 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Lead | 1.30 | 21.0 S | 21.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Nickel | 5.40 | 24.0 S | 24.0 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Silver | 1.30 | 0.650 S U | 0.650 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Thallium | 6.70 | 3.40 S U | 3.40 UJ | - | mg/kg | M |
| CDL-SD12-00-001 | N | Magnesium | 670 | 11000 S | 11000 J | - | mg/kg | M |
| CDL-SD12-00-001 | N | Manganese | 2.00 | 230 S | 230 J | - | mg/kg | M |
| CDL-SD18-00-001 | N | Antimony | 2.00 | 1.50 S U | 1.50 R | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Magnesium | 500 | 8100 S | 8100 J | + | mg/kg | M |
| CDL-SD18-00-001 | N | Sodium | 500 | 21000 | 21000 J | + | mg/kg | M |
| CDL-SD18-00-001 | N | Arsenic | 1.50 | 7.60 S | 7.60 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Barium | 2.60 | 40.0 | 40.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Cadmium | 0.500 | 0.160 JS | 0.160 J | - | mg/kg | M/D/TR |
| CDL-SD18-00-001 | N | Chromium | 1.00 | 37.0 S | 37.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Cobalt | 2.60 | 5.40 S | 5.40 J | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Copper | 1.00 | 14.0 | 14.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Lead | 1.00 | 14.0 S | 14.0 J | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Nickel | 4.00 | 17.0 S | 17.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Selenium | 2.00 | 1.60 U | 1.60 UJ | | mg/kg | D |
| CDL-SD18-00-001 | N | Silver | 1.00 | 0.500 S U | 0.500 UJ | | mg/kg | D |
| CDL-SD18-00-001 | N | Thallium | 5.00 | 2.50 S U | 2.50 UJ | - | mg/kg | M/D |
| CDL-SD18-00-001 | N | Vanadium | 5.00 | 42.0 | 42.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Zinc | 5.00 | 63.0 BS | 63.0 J | | mg/kg | D |
| CDL-SD18-00-001 | N | Potassium | 500 | 4600 S | 4600 J | + | mg/kg | M |
| CDL-SD18-01-001 | N | Antimony | 2.40 | 1.80 U | 1.80 R | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Magnesium | 600 | 9300 | 9300 J | + | mg/kg | M |
| CDL-SD18-01-001 | N | Sodium | 600 | 24000 | 24000 J | + | mg/kg | M |
| CDL-SD18-01-001 | N | Arsenic | 1.80 | 8.10 | 8.10 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Barium | 3.10 | 44.0 | 44.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Cadmium | 0.600 | 0.170 J | 0.170 J | - | mg/kg | M/D/TR |
| CDL-SD18-01-001 | N | Chromium | 1.20 | 41.0 | 41.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Cobalt | 3.10 | 6.00 | 6.00 J | - | mg/kg | M/D |

**Table of All Qualified Results**

| Test Method: SW6010C | Extraction Method: SW3050 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD18-01-001 | N | Copper | 1.20 | 15.0 | 15.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Lead | 1.20 | 16.0 | 16.0 J | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Nickel | 4.80 | 19.0 | 19.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Selenium | 2.40 | 1.90 U | 1.90 UJ | | mg/kg | D |
| CDL-SD18-01-001 | N | Silver | 1.20 | 0.600 U | 0.600 UJ | | mg/kg | D |
| CDL-SD18-01-001 | N | Thallium | 6.00 | 3.00 U | 3.00 UJ | - | mg/kg | M/D |
| CDL-SD18-01-001 | N | Vanadium | 6.00 | 46.0 | 46.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Zinc | 6.00 | 71.0 B | 71.0 J | | mg/kg | D |
| CDL-SD18-01-001 | N | Potassium | 600 | 5100 | 5100 J | + | mg/kg | M |
| CDL-SD19-00-001 | N | Cadmium | 0.760 | 0.300 S U | 0.300 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Chromium | 1.50 | 59.0 S | 59.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Selenium | 3.10 | 2.50 S U | 2.50 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Vanadium | 7.60 | 77.0 S | 77.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Zinc | 7.60 | 89.0 S | 89.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Antimony | 3.10 | 2.30 S U | 2.30 R | - | mg/kg | M/D |
| CDL-SD19-00-001 | N | Arsenic | 2.30 | 20.0 S | 20.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Barium | 4.00 | 62.0 S | 62.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Calcium | 760 | 4100 S | 4100 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Cobalt | 4.00 | 7.70 S | 7.70 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Lead | 1.50 | 23.0 S | 23.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Nickel | 6.10 | 26.0 S | 26.0 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Silver | 1.50 | 0.750 S U | 0.750 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Thallium | 7.60 | 3.80 S U | 3.80 UJ | - | mg/kg | M |
| CDL-SD19-00-001 | N | Magnesium | 760 | 13000 S | 13000 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Manganese | 2.30 | 290 S | 290 J | - | mg/kg | M |
| CDL-SD19-00-001 | N | Potassium | 760 | 7100 S | 7100 J | - | mg/kg | M |

| Test Method: SW7471B | Extraction Method: Total | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD11-00-001 | N | Mercury | 0.420 | 0.110 BJ | 0.420 U | + | mg/kg | L |
| CDL-SD12-00-001 | N | Mercury | 0.310 | 0.110 BJ | 0.310 U | + | mg/kg | L |
| CDL-SD13-00-001 | N | Mercury | 0.310 | 0.130 BJ | 0.310 U | + | mg/kg | L |
| CDL-SD14-00-001 | N | Mercury | 0.290 | 0.130 BJ | 0.290 U | + | mg/kg | L |
| CDL-SD15-00-001 | N | Mercury | 0.220 | 0.0710 BJ | 0.220 U | + | mg/kg | L |
| CDL-SD19-00-001 | N | Mercury | 0.290 | 0.0870 BJ | 0.290 U | + | mg/kg | L |
| CDL-SD20-00-001 | N | Mercury | 0.170 | 0.0830 BJ | 0.170 U | + | mg/kg | L |
| CDL-SD21-00-001 | N | Mercury | 0.320 | 0.0650 BJ | 0.320 U | + | mg/kg | L |

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD13-00-001 | N | 1,1,1-Trichloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1,2,2-Tetrachloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1,2-Trichloro-1,2,2-trifluoroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD13-00-001 | N | 1,1,2-Trichloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,1-Dichloroethene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2,4-Trichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dibromo-3-chloropropane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dibromoethane (EDB) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dichloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,2-Dichloropropane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,3-Dichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 1,4-Dichlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 2-Butanone (MEK) | 67.0 | 69.0 | 69.0 J | - | ug/kg | I |
| CDL-SD13-00-001 | N | 2-Hexanone | 67.0 | 54.0 U | 54.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | 4-Methyl-2-pentanone (MIBK) | 67.0 | 54.0 U | 54.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Acetone | 130 | 330 | 330 J | - | ug/kg | I |
| CDL-SD13-00-001 | N | Benzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Bromodichloromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Bromoform | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Bromomethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Carbon disulfide | 33.0 | 34.0 | 34.0 J | - | ug/kg | I |
| CDL-SD13-00-001 | N | Carbon tetrachloride | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chlorobenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chloroethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chloroform | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Chloromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | cis-1,2-Dichloroethene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | cis-1,3-Dichloropropene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Cyclohexane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Dibromochloromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Dichlorodifluoromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Ethylbenzene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Isopropylbenzene (Cumene) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methyl acetate | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methyl tert-butyl ether (MTBE) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methylcyclohexane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Methylene chloride | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Styrene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Tetrachloroethene (PCE) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Toluene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | trans-1,2-Dichloroethene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | trans-1,3-Dichloropropene | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |

**Table of All Qualified Results**

| Test Method: SW8260B | Extraction Method: SW5035 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD13-00-001 | N | Trichloroethene (TCE) | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Trichlorofluoromethane | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Vinyl chloride | 33.0 | 26.0 U | 26.0 UJ | - | ug/kg | I |
| CDL-SD13-00-001 | N | Xylenes, Total | 33.0 | 53.0 U | 53.0 UJ | - | ug/kg | I |
| CDL-SD16-00-001 | N | cis-1,3-Dichloropropene | 29.0 | 23.0 U | 23.0 UJ | - | ug/kg | M |
| CDL-SD16-00-001 | N | Acetone | 120 | 120 | 120 J | + | ug/kg | M |
| CDL-SD16-01-001 | N | cis-1,3-Dichloropropene | 34.0 | 27.0 S U | 27.0 UJ | - | ug/kg | M |
| CDL-SD16-01-001 | N | Acetone | 140 | 160 S | 160 J | + | ug/kg | M |
| CDL-SD20-00-001 | N | 1,2,4-Trichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,2-Dibromoethane (EDB) | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Bromodichloromethane | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Bromoform | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Carbon tetrachloride | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Dibromochloromethane | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Styrene | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | Bromomethane | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | cis-1,3-Dichloropropene | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | trans-1,3-Dichloropropene | 16.0 | 13.0 U | 13.0 R | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,2-Dichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,3-Dichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | 1,4-Dichlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Benzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Chlorobenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Ethylbenzene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Toluene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | trans-1,2-Dichloroethene | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |
| CDL-SD20-00-001 | N | Trichloroethene (TCE) | 16.0 | 13.0 U | 13.0 UJ | - | ug/kg | M |

| Test Method: SW8270D | Extraction Method: SW3520C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-RBSD1-02-082216 | EB | 3,3'-Dichlorobenzidine | 5.00 | 2.00 L U | 2.00 UJ | - | ug/l | C |

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD16-00-001 | N | Dibenz(a,h)anthracene | 1200 | 60.0 LS U | 60.0 UJ | - | ug/kg | M |
| CDL-SD16-00-001 | N | Hexachloroethane | 1200 | 490 S U | 490 UJ | - | ug/kg | M |
| CDL-SD16-00-001 | N | Hexachlorocyclopentadiene | 3000 | 2400 S U | 2400 R | - | ug/kg | M |
| CDL-SD16-01-001 | N | Dibenz(a,h)anthracene | 1200 | 60.0 L U | 60.0 UJ | - | ug/kg | M |
| CDL-SD16-01-001 | N | Hexachloroethane | 1200 | 490 U | 490 UJ | - | ug/kg | M |
| CDL-SD16-01-001 | N | Hexachlorocyclopentadiene | 3000 | 2400 U | 2400 R | - | ug/kg | M |

**Table of All Qualified Results**

| Test Method: SW8270D | Extraction Method: SW3550C | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD20-00-001 | N | Hexachlorocyclopentadiene | 1900 | 1500 S U | 1500 UJ | - | ug/kg | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| C | LCS Recovery |
| D | MS RPD |
| I | Surrogate recovery outside project limits. |
| L | Lab Blank |
| M | MS Recovery |
| TR | Trace Level Detect |
| V | Equipment Blank |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Post digestion spike? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Serial dilution? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSA? | • | | | |
| Stage 3 & 4 Review: Instrument - ICSAB? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW7470A (Mercury in Water (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW7471B (Mercury in Soil (Manual Cold-Vapor Technique)) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition? | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods check? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies (DQFs)? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Blank - Calibration blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Calibration - LLCCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Precision/Accuracy - Reporting Limit Std.? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD in criteria? | • | | | |

**Review Questions**

| Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | ICV outliers do not result in qualifiers being applied. |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | LCS only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Review Questions**

| Method: SW8270D (Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | | • | | Results noted by lab as out of hold were not reported as best result; no action required. |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | • | | | |
| Stage 3 & 4 Review: Blank - Equipment blank? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | | • | | See QC outlier section |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | | • | | See QC outlier section. LCS only. |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | • | | | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | • | | | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | • | | | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**Level 4**
**Initial Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

Standard ID: RH24027-002
Analyte: Aluminum

Reported Y-Intercept: 0
Reported Slope: 1
Reported Correlation Coefficient (r): 0.9998450

Conc. (y) = Slope (m) * Response (x) + Y-Intercept (b)

| | (x) Response | (y) Conc. |
|---|---|---|
| Level 1 = | 0.00815 | 0 |
| Level 2 = | 0.01804 | 0.4 |
| Level 3 = | 0.13171 | 5 |
| Level 4 = | 0.58811 | 25 |
| Level 5 = | 1.1606 | 50 |

Y-Intercept = 0.01129428
Slope = 0.02301167
r2 = 0.9999506
r = 0.9999753 Matches

Comments:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

| | | | |
|---|---|---|---|
| CCV Standard ID: | CCV1 | CCV Standard ID: | CCV1 |
| Analyte ID: | Barium | Analyte ID: | Calcium |
| CCV % Rec.: | 101 | CCV % Rec.: | 99 |
| True CCV Conc. = | 2.5 | True CCV Conc. = | 50 |
| Found CCV Conc. = | 2.5167 | Found CCV Conc. = | 49.688 |
| Calculated % Rec = | 100.7 Matches | Calculated % Rec = | 99.4 Matches |

Comments:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

LCS ID: RQ21759-002
Analyte ID: Sodium
Recovery: 106

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 2100
LCS Spike Conc. = 2000

% Recovery = 105.0 Matches

Comment: LCS only

**Level 4**
**Matrix Spike**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

| | | | |
|---|---|---|---|
| Sample ID: | RH24027-015MS | Sample ID: | RH24027-015MD |
| Analyte ID: | Ba | Analyte ID: | Cr |
| Recovery: | 84 | RPD: | 45 |

% Recovery = (Conc. MS - Conc. Unspiked Sample) / MS Spike Conc. X 100

RPD = |MS Conc. -MSD Conc.| / (MS Conc. + MSD Conc.)/2 X 100

| | | | |
|---|---|---|---|
| Conc. MS Sample = | 930.00 | MS Conc. = | 460 |
| Unspiked Samp. = | 40.00 | MSD Conc. = | 730 |
| MS Spike Conc. = | 1100.00 | | |
| | | RPD = | -45.38% Matches |
| % Recovery = | 81 Matches | | |

Comments:

**Level 4**
**ICP Serial Dilutions**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Service | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

Sample ID: RH24027-002 CDL-RBSD1-02-082216L
Analyte ID: Na
%D: 53

Undiluted Sample Conc. = 1.243
Dilution Conc. = 1.902

Calculated %D = -53.017 Matches

%D Indicating Bias = 53.0

Comments:

**Level 4**
**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW6010C

**CALCULATIONS**

ug/L = Raw Data Conc. (ug/L) X Final Vol. (mL) X Dilution Factor
Initial Sample Amount (g or mL) * % Solids

Sample ID: **RH24027-012** CDL-SD16-01-001 % Solids = 27.2%

| Analyte | IDL (ug/L) | Corrected IDL (ug/L) | Labortory Reported (ug/L) | Corrected Result (mg/kg) | Raw Data (mg/kg) | Inst. Dilution Factor | Initial Samp. Vol. (g) | Final Samp. Vol. (mL) |
|---|---|---|---|---|---|---|---|---|
| Al | 0.095 | 4.01861 | 22000.0 | **22324.8** | 143.55 | 1 | 1.182 | 50 |
| Sb | 0.007 | 0.29611 | 2.3 U | **0.3** | 0.00216 | 1 | 1.182 | 50 |
| As | 0.0022 | 0.09306 | 8.5 | **8.5** | 0.05466 | 1 | 1.182 | 50 |
| Ba | 0.0019 | 0.08037 | 48 | **48.3** | 0.31081 | 1 | 1.182 | 50 |
| Be | 0.0002 | 0.00846 | 0.61 | **0.6** | 0.00391 | 1 | 1.182 | 50 |
| Cd | 0.0005 | 0.02115 | 0.28 | **0.3** | 0.0018 | 1 | 1.182 | 50 |
| Ca | 0.129 | 5.45685 | 3000 | **2970.6** | 19.101 | 1 | 1.182 | 50 |
| Cr | 0.0007 | 0.02961 | 49 | **48.8** | 0.31381 | 1 | 1.182 | 50 |
| Co | 0.001 | 0.0423 | 7.00 | **7.0** | 0.04498 | 1 | 1.182 | 50 |
| Cu | 0.002 | 0.0846 | 18 | **17.7** | 0.11389 | 1 | 1.182 | 50 |
| Fe | 0.033 | 1.39594 | 27000 | **26701.1** | 171.69 | 1 | 1.182 | 50 |
| Pb | 0.0047 | 0.19882 | 20 | **20.0** | 0.12844 | 1 | 1.182 | 50 |
| Mg | 0.262 | 11.0829 | 9100 | **9138.3** | 58.76 | 1 | 1.182 | 50 |
| Mn | 0.001 | 0.0423 | 220 | **217.4** | 1.398 | 1 | 1.182 | 50 |
| | | | | | | | | |
| Ni | 0.003 | 0.1269 | 22 | **21.8** | 0.14014 | 1 | 1.182 | 50 |
| K | 0.303 | 12.8173 | 5400 | **5421.2** | 34.859 | 1 | 1.182 | 50 |
| Se | 0.0085 | 0.35956 | 2.8 U | **0.7** | 0.00445 | 1 | 1.182 | 50 |
| Ag | 0.0021 | 0.08883 | 0.96 U | **-0.019** | -0.0001 | 1 | 1.182 | 50 |
| Na | 0.331 | 14.0017 | 21000 | **20671.6** | 132.92 | 1 | 1.182 | 50 |
| Tl | 0.005 | 0.21151 | 3.1 U | **0.0** | | 1 | 1.182 | 50 |
| | | | | | | | | |
| V | 0.003 | 0.1269 | 54.00 | **54.2** | 0.34853 | 1 | 1.182 | 50 |
| Zn | 0.002 | 0.0846 | 86.00 | **86.3** | 0.55493 | 1 | 1.182 | 50 |

Comments -

**Level 4**
**Initial Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Cal ID: 16HG2193
Analyte: Hg (8/30/16)

Correlation Coeff: 0.999536
Intercept: 0.00024
Slope: 0.10248

Response (y) = Slope (m) * Conc. (x) + Y-Intercept (b)

| | (x) Conc. | (y) Response |
|---|---|---|
| Level 1 = | 0 | -31 |
| Level 2 = | 1 | 3232 |
| Level 3 = | 5 | 19272 |
| Level 4 = | 10 | 41986 |
| Level 5 = | 15 | 62567 |
| Level 6 = | 20 | 80984 |

| | | |
|---|---|---|
| Corr Coef = | 0.999536 | Matches |
| Slope = | 0.000242 | Matches |
| Y-Int = | 0.10248 | Matches |

Comments:

**Level 4**
**Initial Calibration Verification**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

ICV Standard ID: ICV HG3083016A (8/30/2016)
Analyte ID: Hg
ICV % Rec.: 91

True ICV Conc. = 0.010
Found ICV Conc. = 0.00906

Calculated % D = 90.6

Comment:

**Level 4**
**Continuing Calibration**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

CCV Standard ID: CCV1 HG30083016A (8/30/2016) 8/30/2016 p 5420
Analyte ID: Hg
%D: 88.1

True CCV Conc. = 10.000
Found CCV Conc. = 8.81

Calculated % D = 88.1 Matches

Comment:

**Level 4**
**Laboratory Control Sample**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

LCS ID: RQ20976-002
Analyte ID: Hg
Recovery: 114

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 0.0023
LCS Spike Conc. = 0.0020

% Recovery = 115.0 Matches

Comments: LCS only

**Sample Result Verification**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/14/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

**Method:** SW7470A

**CALCULATIONS**

Comments: All sample results were non-detects

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8260B

**CALCULATIONS**

| | |
|---|---|
| Tune ID: | 5083016, BFBEX |
| Recalculated Ion Ratio: | 175:174 |
| Reported Ratio: | 7.50% |

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 13289
Reference Mass Response = 176256

Relative Abundance = 7.54% Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Service | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

RRF Standard ID: 5082916B.b
Compound ID: Acrolein
Reported Result: 51.626000

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc.

Compound Area = 46682
I.S. Area = 30674
Compound Conc. = 5
I.S. Conc. = 5

RRF = 1.521875

Calibration ID: 5082916B.b
Compound ID: Acrolein
%RSD: 2.04500
Average RRF = 3.706

%RSD = Standard Deviation / Average RRF X 100

RF Level 1 =
RF Level 2 = 3.682000
RF Level 3 = 3.682000
RF Level 4 = 3.670000
RF Level 5 = 3.670000
RF Level 6 = 3.67000

Standard Deviation = 0.007
Average RRF = 3.674800 Matches
%RSD = 0.17886

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

| | | | |
|---|---|---|---|
| RRF Standard ID: | 5083016, VSTD050EX | %D Standard ID: | 15112316, VSTD050LD |
| Compound ID: | Bromoform | Compound ID: | Chlorobenzene |
| Reported Result: | 0.264768 | Reported %D: | 1.1% |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

| | | | |
|---|---|---|---|
| Compound Area = | 182309 | Average RRF = | 1.074680 |
| I.S. Area = | 688562 | CCV RRF = | 1.063476 |
| Compound Conc. = | 50 | | |
| I.S. Conc. = | 50 | %D = | 1.0 Matches |
| CCV RRF = | 0.264768 Matches | %D Indicating Bias = | -1.0 |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8260B

**CALCULATIONS**

Sample ID: CDL-SD12-00-001 RH24027-001
Compound ID: 1,2-Dichloroethane-d4
Reported Result: 88%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 44.20
Surr. Spike Conc. = 50.00

% Recovery = 88 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**MATRIX SPIKE DUPLICATES**

SDG #: RH24027
Lab: Shealy Environmental Service
Client: CDM Smith

Date: 11/17/17
Page: 1 of 1
Validated by: GG
Second Review by: LS

Method: SW8260B

**CALCULATIONS**

Sample ID: RH24027-008MS
Compound ID: Acetone
Recovery: 147

Sample ID: RH24027-08MD
Compound ID: Trichlorofluoromethane
RPD: 21.0

% Recovery = (Conc. MS - Conc. Unspiked Sample) / MS Spike Conc. X 100

RPD = |MS Conc. - MSD Conc.| / (MS Conc. + MSD Conc.)/2 X 100

Conc. MS = 560.0
Unspiked Samp. = 130.0
MS Spike Conc. = 290.0

% Recovery = 148 Matches

MS Conc. = 49.62
MSD Conc. = 61.25

RPD = 20.97 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8260B

**CALCULATIONS**

Sample ID: RQ20963-002
Compound ID: Cyclohexane
Recovery: 112%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 56.00
LCS Spike Conc. = 50.00

% Recovery = 112 Matches

Comments: LCS only

**GC/MS VALIDATION WORKSHEET**
**Duplicate/Field Duplicates**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

Sample ID: RH24027-011DU
Analyte ID: Acetone
RPD: 26%

$$RPD = \frac{|\text{Sample Conc.} - \text{Duplicate Conc.}|}{(\text{Sample Conc.} + \text{Duplicate Conc.})/2} \times 100$$

Sample Conc. = 33.977
Duplicate Conc. = 26.223

RPD = 25.7608

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |
| Method: | SW8260B | | |

**CALCULATIONS**

| | |
|---|---|
| | RH24027-004 |
| Sample ID: | CDL-SD14-00-001 |
| Compound ID: | Carbon Disulfide |
| Reported Result: | 55 ug/kg |

$$\text{Conc. In Sample} = \frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \frac{\text{Dilution Factor}}{\text{\% Solids}}$$

| | | Units |
|---|---|---|
| Area Sample = | 115239 | Area |
| Area I.S. = | 337222 | Area |
| Conc. I.S. = | 50 | |
| Average RRF = | 1.757056 | NA |
| Final Volume = | 5.0 | mL |
| Initial Amount = | 3.3 | |
| Dilution Factor = | 1.0 | NA |
| % Solids = | 26.4% | |
| Conc. In Sample = | 55.14 | |
| | Match | |

Comments

**GC/MS VALIDATION WORKSHEET**
**INSTRUMENT PERFORMANCE CHECK**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

Tune ID: 10090116B.b, RH24027-009
Recalculated Ion Ratio: 443:442
Reported Ratio: 22.200%

$$\text{Relative Abundance (Ion Ratio)} = \frac{\text{Response of Target Mass}}{\text{Response of Reference Mass}} \times 100$$

Target Mass Response = 1799168
Reference Mass Response = 8099840

Relative Abundance = 22.2 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

RRF Standard ID: STD3 L2
Compound ID: Benzaldehyde
Reported Result: 1.2308

$$RRF = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

Compound Area = 54653
I.S. Area = 888072
Compound Conc. = 1.0
I.S. Conc. = 20

RRF = 1.2308
Matches

Calibration ID: 10090116
Compound ID: 1,4-Dichlorobenzene
%RSD: 3.90%
Average RRF: 1.585683

$$\%RSD = \frac{\text{Standard Deviation}}{\text{Average RRF}} \times 100$$

RF Level 1 = 1.5139
RF Level 2 = 1.5354
RF Level 3 = 1.5243
RF Level 4 = 1.5731
RF Level 5 = 1.5935
RF Level 6 = 1.5976
RF Level 7 = 1.6769
RF Level 8 = 1.6707

Standard Deviation = 0.063
Average RRF = 1.5857 Matches
%RSD = 3.94 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

RRF Standard ID: CCV 10090116.b\10090127
Compound ID: Benzidine
Reported Result: 1.2647

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

Compound Area = 8907163
I.S. Area = 1878055
Compound Conc. = 75
I.S. Conc. = 20

CCV RRF = 1.265 Matches

%D Standard ID: 0091516.b\10091503
Compound ID: 2-Nitroaniline
Reported %D: 0.1%

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

Ccal Amount = 14.978
Standard Amt = 15

%D = 0.15 Matches

%D Indicating Bias = -0.15

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

Sample ID: CDL-SD12-00-001 - RH24027-009
Compound ID: Terphenyl-d14
Reported Result: 77%

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 7.67
Surr. Spike Conc. = 10.00

% Recovery = 77 Match

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

### CALCULATIONS

Sample ID: RH24027-008MS
Compound ID: Acenaphthene
Recovery: 59%

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

Conc. MS = 2200.00
Unspiked Samp. = 0.0
MS Spike Conc. = 3700.0

% Recovery = 59 Matches

Sample ID: RH24027-008MS
Compound ID: Acenaphthene
RPD: 19

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

MS Conc. = 965.95
MSD Conc. = 1164

RPD = 18.6 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

Sample ID: RQ20635-002
Compound ID: 2-Chlorophenol
Recovery: 69%

$$\% \text{ Recovery} = \frac{\text{Conc. LCS}}{\text{LCS Spike Conc.}} \times 100$$

Conc. LCS = 6.90
LCS Spike Conc. = 10.00

% Recovery = 69 Matches

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | RH24027 | Date: | 11/17/17 |
| Lab: | Shealy Environmental Services | Page: | 1 of 1 |
| Client: | CDM Smith | Validated by: | GG |
| | | Second Review by: | LS |

Method: SW8270D

**CALCULATIONS**

| | |
|---|---|
| | RH24027-011 |
| Sample ID: | CDL-SD16-00-001 |
| Compound ID: | Fluoranthene |
| Reported Result: | 17 ug/kg |

| | | Units | |
|---|---|---|---|
| Area Sample = | 5136 | Area | |
| Area I.S. = | 2846616 | Area | 2,4,6-Tribromophenol |
| Conc. I.S. = | 20 | | |
| Average RRF = | 1.284698 | NA | |
| Final Volume = | 5000 | | |
| Initial Amount = | 30.4 | | |
| Dilution Factor = | 1 | NA | |
| % Solids = | 27.70% | | |
| Conc. In Sample = | **16.7** | | |
| | Matches | | |

Comments:

| | |
|---|---|
| Facility: | C03VA0301-15, Wallops Flight Facility, Active Rem. |
| Event: | Construction Debris Landfill, 2016-Q3 |
| SDG: | 9684_HDOX |
| Guidance Document: | Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 |
| Prime Contractor: | CDM Smith, Inc., Boston, MA |
| Project Manager: | Lynne France |
| Contract Laboratory: | CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC |
| Data Review Contractor: | Synectics, Sacramento, CA |
| Data Review Level: | Level 4 |
| Primary Data Reviewer: | James Parker, Senior Scientist |
| Second Reviewer: | Evin McKinney, Senior Scientist |
| Date Submitted: | November 28, 2017 |

| Field Sample ID | Lab Sample ID | Matrix | Type/Type Code | E1613 |
|---|---|---|---|---|
| CDL-RBSD1-02-082216 | 9684004 | Water | Equipment Blank/EB | X |
| CDL-SD11-00-001 | 9684008 | Solid | Field Sample/N | X |
| CDL-SD12-00-001 | 9684002 | Solid | Field Sample/N | X |
| CDL-SD13-00-001 | 9684007 | Solid | Field Sample/N | X |
| CDL-SD14-00-001 | 9684005 | Solid | Field Sample/N | X |
| CDL-SD15-00-001 | 9684006 | Solid | Field Sample/N | X |
| CDL-SD16-00-001 | 9684012 | Solid | Field Sample/N | X |
| CDL-SD16-01-001 | 9684013 | Solid | Field Sample/N | X |
| CDL-SD17-00-001 | 9684014 | Solid | Field Sample/N | X |
| CDL-SD17-01-001 | 9684015 | Solid | Field Sample/N | X |
| CDL-SD18-00-001 | 9684016 | Solid | Field Sample/N | X |
| CDL-SD18-01-001 | 9684017 | Solid | Field Sample/N | X |
| CDL-SD19-00-001 | 9684003 | Solid | Field Sample/N | X |
| CDL-SD20-00-001 | 9684009 | Solid | Field Sample/N | X |
| CDL-SD21-00-001 | 9684001 | Solid | Field Sample/N | X |

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Project-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for Project 15 – Construction Debris Landfill Feasibility Study Wallops Flight Facility (WFF) Chincoteague, Virginia, Sept 2015 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by CDM Smith, Inc., Boston, MA; analyses were performed by CAPE FEAR ANALYTICAL, LLC, WILMINGTON, NC and were reported under sample delivery group (SDG) 9684_HDOX. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

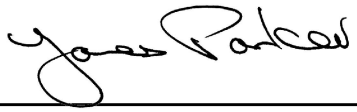
- Blank
- Blank - Negative
- Equipment Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (0.39%) out of the 255 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

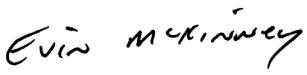
| Analytical Method | Data Reviewer Comment |
|---|---|
| E1613 | The laboratory noted that MS/MSD recoveries were outside control limits. |



November 17, 2017

Reviewed by James Parker, Senior Scientist, Synectics, Sacramento, CA

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



November 28, 2017

Reviewed by Evin McKinney, Senior Scientist, Synectics, Sacramento, CA

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

**Quality Control Outliers for test method E1613, MS Recovery**

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

| Sample ID/ Lab Sample ID | Analyte | Result | Warning Limits | Control Limits | Units | Qualifier | Reason Code | Comment |
|---|---|---|---|---|---|---|---|---|
| CDL-SD20-00-001 (MS)/ 9684010 | Octachlorodibenzo -p-dioxin | 202.0 | 93 - 162 | 10 - 162 | percent | J/None | M | |
| CDL-SD20-00-001 (SD)/ 9684011 | Octachlorodibenzo -p-dioxin | 212.0 | 93 - 162 | 10 - 162 | percent | J/None | M | |

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

**Qualified Results associated with the MS Recovery for E1613**

| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
|---|---|---|---|---|---|---|---|---|
| CDL-SD20-00-001 | N | Octachlorodibenzo-p-dioxin | 9.67 | 218 | 218 J | + | pg/g | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

**Table of All Qualified Results**

| Test Method: E1613 Extraction Method: SW3540C | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FieldSample ID | Type | Analyte | LOQ | Lab Result | Qualified Result | Bias | Units | Reason |
| CDL-SD20-00-001 | N | Octachlorodibenzo-p-dioxin | 9.67 | 218 | 218 J | + | pg/g | M |

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

**Reason Code Definitions**

| Code | Definition |
|---|---|
| M | MS Recovery |
| TR | Trace Level Detect |

**Flag Code and Definitions**

| Flag | Definition |
|---|---|
| U | Undetected: The analyte was analyzed for, but not detected. |
| UJ | The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria. |
| J | Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| R | The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making. |
| B | Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample. |
| UB | The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected. |

**Review Questions**

| Method: E1613 (EPA Standard Method for High Resolution Analysis of Dioxins/Furans in Water) | | | | |
|---|---|---|---|---|
| Review Questions | Yes | No | NA | Comment |
| Stage 3 & 4 Review: COC - Custody Trail? | • | | | |
| Stage 3 & 4 Review: COC - Temperature/Condition | • | | | |
| Stage 3 & 4 Review: COC - Receipt anomalies? | • | | | |
| Stage 3 & 4 Review: COC - Sample/Methods checked? | • | | | |
| Stage 3 & 4 Review: Case Narrative - Anomalies? | • | | | |
| Stage 3 & 4 Review: Samples - Collection date? | • | | | |
| Stage 3 & 4 Review: Samples - Extraction date? | • | | | |
| Stage 3 & 4 Review: Samples - Analysis date? | • | | | |
| Stage 3 & 4 Review: Samples - Holding time? | • | | | |
| Stage 3 & 4 Review: Samples - Batching? | • | | | |
| Stage 3 & 4 Review: Samples - Surrogate recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Internal standard recoveries? | • | | | |
| Stage 3 & 4 Review: Samples - Lab qualifiers? | • | | | |
| Stage 3 & 4 Review: Blank - Method blank? | • | | | |
| Stage 3 & 4 Review: Blank - Trip blank? | | | • | |
| Stage 3 & 4 Review: Blank - Equipment blank? | • | | | |
| Stage 3 & 4 Review: Calibration - ICAL? | • | | | |
| Stage 3 & 4 Review: Calibration - ICV? | • | | | |
| Stage 3 & 4 Review: Calibration - CCV? | • | | | |
| Stage 3 & 4 Review: Precision/Accuracy - MS/MSD? | • | | | See QC Outliers. |
| Stage 3 & 4 Review: Precision/Accuracy - LCS/LCSD? | • | | | |
| Stage 3 & 4 Review: Instrument - Tune? | • | | | |
| Stage 3 & 4 Review: Quantitation - PQLs? | • | | | PQL's were raised in association with undiluted analyses that reported non-detects and positive target analyte hits |
| Stage 3 & 4 Review: Quantitation - Dilution Factor? | • | | | |
| Stage 3 & 4 Review: Quantitation - Results (RT, Ions, Rel. Itens.)? | • | | | |
| Stage 3 & 4 Review: Quantitation - Retention times? | • | | | |
| Stage 3 & 4 Review: Quantitation - Major ions present? | • | | | |
| Stage 3 & 4 Review: Quantitation - Relative intensities? | • | | | |
| Stage 3 & 4 Review: Quantitation - Column/Detector RPD? | | | • | |
| Stage 3 & 4 Review: Quantitation - Confirmation? | | | • | |
| Stage 3 & 4 Review: Quantitation - Recalculated results match hardcopy? | • | | | |
| Stage 3 & 4 Review: Field Duplicates - RPD within limits? | | | • | |
| Stage 4 Review: Reviewed Chromatograms/Spectra? | • | | | |

**GC/MS VALIDATION WORKSHEET**
**INITIAL CALIBRATION**

SDG #: 9864
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: JP
Second Review by: EM

| | |
|---|---|
| Were all standards analyzed at the appropriate concentrations? | **Yes** |
| Were all samples associated with an acceptable initial calibration? | **Yes** |
| Were five RRF RSD's ≤ 35%? | **Yes** |
| Were five RRF RSD's ≤ 25%? | **Yes** |
| Were the GC resolution criteria are met [Percent Valley (% Valley) ≤25% | **Yes** |
| Were recalculations performed on a representative sample of the RRFs? | **Yes** |
| Were recalculations performed on a representative sample of the %RSDs? | **Yes** |

List any samples which did not meet the specified criteria below, and describe reasons for qualification in Comment section.

**CALCULATIONS**

RRF Standard ID: CS0.5 UD141224-02 Calibration ID: CFA_1613_A06NOV15.mdb
Compound ID: 123678-$H_X$CDD Compound ID: 2378-TCDD
Reported Result: 0.998 pg. 637 %RSD: 4.79031 page 636
Average RRF = 1.182

RRF = Compound Area X I.S. Conc. / I.S. Area X Compound Conc. page 169, 173

%RSD = Standard Deviation / Average RRF X 100

Compound Area = 34400 page 647
I.S. Area = 2760000
Compound Conc. = 1.25
I.S. Conc. = 100

RRF = 0.997
Matches

RF Level 1 = 1.282
RF Level 2 = 1.115
RF Level 3 = 1.146
RF Level 4 = 1.174
RF Level 5 = 1.190
RF Level 6 = 1.184
RF Level 7 =
RF Level 8 =
RF Level 9 =

Standard Deviation = 0.056
Average RRF = 1.182
%RSD = 4.774

Matches
Close Match (rounding)

Comments:

**GC/MS VALIDATION WORKSHEET**
**CONTINUING CALIBRATION**

| | | | |
|---|---|---|---|
| SDG #: | 9864 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were all samples associated with an acceptable continuing calibration? | **Yes** |
| Were all RRF %D values ≤ 35%? | **Yes** |
| Were recalculations performed on a representative sample of the RRFs? | **Yes** |
| Were recalculations performed on a representative sample of the %Ds? | **Yes** |

List any samples which did not meet the specified criteria below, and describe reasons for qualification in Comment section. **Include +/- notation to denote bias of %D outliers.**

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| RRF Standard ID: | A14SEP16A-11 9/14/2016 20:13 | | %D Standard ID: | A14SEP16A-11 9/14/2016 20:13 | |
| Compound ID: | 234678-$H_X$CDF | | Compound ID: | 123789-$H_X$CDD | |
| Reported Result: | 1.159 | page 757 | Reported %D: | 0.9% | page 757 |

$$\text{CCV RRF} = \frac{\text{Compound Area X I.S. Conc.}}{\text{I.S. Area X Compound Conc.}}$$

$$\%D = \frac{\text{Average RRF - CCV RRF}}{\text{Average RRF}} \times 100$$

| | | | | | |
|---|---|---|---|---|---|
| Compound Area = | 1750000 | page 757 | Average RRF = | 0.978189 | page 637 |
| I.S. Area = | 3020000 | page 757 | CCV RRF = | 0.969000 | page 757 |
| Compound Conc. = | 50 | | | | |
| I.S. Conc. = | 100 | page 758 | %D = | 0.9 | Matches |
| CCV RRF = | 1.159 | Matches | %D Indicating Bias = | -0.9 | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**SURROGATE SPIKES/SYSTEM MONITORING COMPOUNDS - WATER SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | 9864 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

Were all surrogate recoveries within the specified criteria (65-135%)? **Yes**
Were recalculations performed on a representative sample of the results? **Yes**

List any samples which did not have acceptable surrogate recoveries.

Any non-detect result associated with a surrogate recovery below 10% should be rejected.

**CALCULATIONS**

Sample ID: CDL-SD21-00-001
Compound ID: 13C-OCDD
Reported Result: 55.0% page 15

$$\% \text{ Recovery} = \frac{\text{Conc. Surr. In Sample}}{\text{Conc. Surr. Spiked}} \times 100$$

Conc. In Sample = 376.00 page 15
Surr. Spike Conc. = 684.00

% Recovery = 55.0 Matches

Comments:

## GC/MS VALIDATION WORKSHEET - MATRIX SPIKES/DUPLICATES

SDG #: 9864
Lab: Cape Fear Analytical
Client: Shealy Environmental Services

Date: 11/17/17
Page: 1 of 1
Validated by: JP
Second Review by: EM

Were MS/MSD samples analyzed at the proper frequency? **Yes**
Were all spike recoveries and RPD values within the established criteria? **No**
Were recalculations performed on a representative sample of the results? **Yes**
If no, list outliers below. (see outlier report)

### CALCULATIONS

Sample ID: CDL-SD20-00-001 MS
Compound ID: 1,2,3,4,6,7,8,9-OCDD
Recovery: 202.0% page

Sample ID: CDL-SD20-00-001 MS/MSD
Compound ID: 1,2,3,4,6,7,8,9-OCDF
RPD: 8.60 page 60

$$\% \text{ Recovery} = \frac{\text{Conc. MS - Conc. Unspiked Sample}}{\text{MS Spike Conc.}} \times 100$$

$$\text{RPD} = \frac{|\text{MS Conc. - MSD Conc.}|}{(\text{MS Conc. + MSD Conc.})/2} \times 100$$

| | | |
|---|---|---|
| Conc. MS = | 609.00 | page 59 |
| Unspiked Samp. = | 218.0 | page 31 |
| MS Spike Conc. = | 194.0 | page 59 |
| % Recovery = | 201.5 | Matches |

| | | |
|---|---|---|
| MS Conc. = | 218.00 | page 59 |
| MSD Conc. = | 238.00 | page 60 |
| RPD = | 8.77 | Matches |

Comments:

**GC/MS VALIDATION WORKSHEET**
**LABORATORY CONTROL SAMPLES**

| | | | |
|---|---|---|---|
| SDG #: | 9864 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were laboratory control samples analyzed at the proper frequency? | **Yes** |
| Were all spike recoveries and RPD values within the established criteria? | **Yes** |
| Were recalculations performed on a representative sample of the results? | **Yes** |
| If no, list outliers below. (see outlier report) | |

**CALCULATIONS**

| | | | | | |
|---|---|---|---|---|---|
| Sample ID: | LCS for batch 32742 | | Sample ID: | LCS/LCSD for batch 32748 | |
| Compound ID: | 1,2,3,4,6,7,8,9-OCDD | | Compound ID: | 1,2,3,4,7,8,9-HpCDF | |
| Recovery: | 106% | page 55 | RPD: | 8% | |
| % Recovery = | Conc. LCS / LCS Spike Conc. X 100 | | RPD = | \|LCS Conc. - LCSD Conc.\| / (LCS Conc. + LCSD Conc.)/2 X 100 | |
| Conc. LCS = | 2120.00 | 55 | LCS Conc. = | 96.80 | page 57 |
| LCS Spike Conc. = | 2000.00 | page 134 | LCSD Conc. = | 105.00 | page 58 |
| % Recovery = | 106 | Matches | RPD = | 8.1 | |
| | | | | Matches | |

Comments:

**GC/MS VALIDATION WORKSHEET**
**TARGET COMPOUND QUANTITATION**

| | | | |
|---|---|---|---|
| SDG #: | 9864 | Date: | 11/17/17 |
| Lab: | Cape Fear Analytical | Page: | 1 of 1 |
| Client: | Shealy Environmental Services | Validated by: | JP |
| | | Second Review by: | EM |

| | |
|---|---|
| Were recalculations performed on at least 10% of positive results? | **Yes** |
| Did all raw data agree with the final reported results? | **Yes** |
| Were positive hits verified by acceptable mass spectra? | **Yes** |
| Were all retention times within 0.06 RRT units of the daily standard? | **Yes** |

**CALCULATIONS**

Sample ID: CDL-SD21-00-001 (9684001)
Compound ID: 1,2,3,4,6,7,8,9-OCDD
Reported Result: 1030 pg/g page 48

Conc. In Sample = $\frac{\text{Area Cmpd. In Sample}}{\text{Area of I.S.}} \times \frac{\text{Conc. of I.S.}}{\text{Average RRF}} \times \frac{\text{Final Volume}}{\text{Initial Amount}} \times \text{Dilution Factor}$

| | | Units | |
|---|---|---|---|
| Area Sample = | 1310000 | Area | page 66 |
| Area I.S. = | 875000 | Area | page 67 |
| Conc. I.S. = | 100 | | |
| Average RRF = | 0.999393 | NA | page 637 |
| Final Volume = | 40.0 | uL | page 616 |
| Initial Amount = | 25.3 | g | page 616 |
| Dilution Factor = | 1.0 | NA | page 64 |
| % Solids = | 23.1% | | |
| Conc. In Sample = | 1025 | | |
| | Match | | |

Comments

# Appendix E

## Duplicate Pair Analytical Data

**Table E-1**
**Relative Percent Difference Calculations for Water Supply Well Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TOC-06 | | TOC-06 | | Relative Percent Difference | TOC-06 | | TOC-06 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PWTOC06-00-309450 | | CDL-PWTOC06-01-309450 | | | CDL-PWTOC06-00-309450-02 | | CDL-PWTOC06-01-309450-02 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,1,2-Trichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,1-Dichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,1-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,2-Dibromoethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,2-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,2-Dichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,2-Dichloropropane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,3-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 1,4-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| 2-Butanone (MEK) | µg/l | 4 | U | 4 | U | NC | NA | | NA | | NC |
| 2-Hexanone | µg/l | 4 | U | 4 | U | NC | NA | | NA | | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 | U | 4 | U | NC | NA | | NA | | NC |
| Acetone | µg/l | 4 | U | 4 | U | NC | NA | | NA | | NC |
| Benzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Bromodichloromethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Bromoform | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Bromomethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| BTEX Total | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Carbon Disulfide | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Carbon Tetrachloride | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Chlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Chloroethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Chloroform | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Chloromethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| cis-1,2-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| cis-1,3-Dichloropropene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Cyclohexane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Dibromochloromethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Dichlorodifluoromethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Ethylbenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Isopropylbenzene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Methyl Acetate | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Methyl Tert-Butyl Ether | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Methylcylohexane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Methylene Chloride | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Styrene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Tetrachloroethene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Toluene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| trans-1,2-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| trans-1,3-Dichloropropene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Trichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Trichlorofluoromethane | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Vinyl Chloride | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| Xylenes (Total) | µg/l | 0.8 | U | 0.8 | U | NC | NA | | NA | | NC |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2,4,5-Trichlorophenol | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2,4,6-Trichlorophenol | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2,4-Dichlorophenol | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2,4-Dimethylphenol | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| 2,4-Dinitrophenol | µg/l | NA | | NA | | NC | 3.2 | U | 3.2 | U | NC |
| 2,4-Dinitrotoluene | µg/l | NA | | NA | | NC | 1 | U | 1 | U | NC |
| 2,6-Dinitrotoluene | µg/l | NA | | NA | | NC | 1 | U | 1 | U | NC |
| 2-Chloronaphthalene | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2-Chlorophenol | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2-Methylnaphthalene | µg/l | NA | | NA | | NC | 0.1 | U | 0.1 | U | NC |
| 2-Methylphenol | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 2-Nitroaniline | µg/l | NA | | NA | | NC | 1.6 | U | 1.6 | U | NC |
| 2-Nitrophenol | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| 3,3'-Dichlorobenzidine | µg/l | NA | | NA | | NC | 2 | U | 2 | U | NC |
| 3-Nitroaniline | µg/l | NA | | NA | | NC | 1.6 | U | 1.6 | U | NC |
| 4,6-Dinitro-2-Methylphenol | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |
| 4-Bromophenyl Phenyl Ether | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 4-Chloro-3-Methylphenol | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| 4-Chloroaniline | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 4-Chlorophenyl Phenyl Ether | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| 4-Nitroaniline | µg/l | NA | | NA | | NC | 1.6 | U | 1.6 | U | NC |
| 4-Nitrophenol | µg/l | NA | | NA | | NC | 2 | U | 2 | U | NC |
| Acenaphthene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Acenaphthylene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Acetophenone | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| Anthracene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Atrazine | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Benzaldehyde | µg/l | NA | | NA | | NC | 2 | U | 2 | U | NC |
| Benzo(a)Anthracene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Benzo(a)Pyrene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Benzo(b)Fluoranthene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Benzo(g,h,i)Perylene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Benzo(k)Fluoranthene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Benzyl Butyl Phthalate | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |
| Bis(2-Chloroethoxy)Methane | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Bis(2-Chloroethyl) Ether | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |
| Bis-Chloroisopropyl ether | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Caprolactam | µg/l | NA | | NA | | NC | 1.2 | J | 4 | U | NC |
| Carbazole | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| Chrysene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| m & p Cresol | µg/l | NA | | NA | | NC | 2 | U | 2 | U | NC |
| Dibenzo(a,h)Anthracene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Dibenzofuran | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Diethyl Phthalate | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |
| Dimethyl Phthalate | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |

**Table E-1**
**Relative Percent Difference Calculations for Water Supply Well Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | TOC-06 | | TOC-06 | | Relative Percent Difference | TOC-06 | | TOC-06 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PWTOC06-00-309450 | | CDL-PWTOC06-01-309450 | | | CDL-PWTOC06-00-309450-02 | | CDL-PWTOC06-01-309450-02 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | |
| Di-N-Butylphthalate | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | |
| Di-N-Octylphthalate | µg/l | NA | | NA | | NC | 4 | U | 4 | U | NC |
| Fluoranthene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Fluorene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Hexachloro-1,3-Butadiene | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Hexachlorobenzene | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| Hexachlorocyclopentadiene | µg/l | NA | | NA | | NC | 3.2 | U | 3.2 | U | NC |
| Hexachloroethane | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Indeno(1,2,3-cd)Pyrene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Isophorone | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| Naphthalene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Nitrobenzene | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| N-Nitroso-Di-N-Propylamine | µg/l | NA | | NA | | NC | 0.8 | U | 0.8 | U | NC |
| N-Nitrosodiphenylamine | µg/l | NA | | NA | | NC | 0.92 | U | 0.92 | U | NC |
| Pentachlorophenol | µg/l | NA | | NA | | NC | 1.5 | U | 1.5 | U | NC |
| Phenanthrene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| Phenol | µg/l | NA | | NA | | NC | 0.4 | U | 0.4 | U | NC |
| Pyrene | µg/l | NA | | NA | | NC | 0.16 | U | 0.16 | U | NC |
| **Dioxins/Furans** | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,4,7,8-HXCDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,6,7,8-HXCDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,7,8,9-HXCDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 2,3,4,6,7,8-HXCDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 2,3,4,7,8-PECDF | pg/l | 35.1 | U | 34.8 | U | NC | NA | | NA | | NC |
| 2,3,7,8-TCDD | pg/l | 6.99 | UJ | 6.94 | UJ | NC | NA | | NA | | NC |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 6.99 | UJ | 6.94 | UJ | NC | NA | | NA | | NC |
| OCDD | pg/l | 69.9 | U | 69.4 | U | NC | NA | | NA | | NC |
| OCDF | pg/l | 69.9 | U | 69.4 | U | NC | NA | | NA | | NC |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0 | U | 0 | U | NC | NA | | NA | | NC |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 20 | | 19.8 | | 1.0% | NA | | NA | | NC |
| **Total Inorganics** | | | | | | | | | | | |
| Aluminum | mg/l | NA | | NA | | NC | 0.2 | U | 0.2 | U | NC |
| Antimony | mg/l | NA | | NA | | NC | 0.015 | U | 0.015 | U | NC |
| Arsenic | mg/l | NA | | NA | | NC | 0.008 | U | 0.008 | U | NC |
| Barium | mg/l | NA | | NA | | NC | 0.013 | U | 0.013 | U | NC |
| Beryllium | mg/l | NA | | NA | | NC | 0.0025 | U | 0.0025 | U | NC |
| Cadmium | mg/l | NA | | NA | | NC | 0.0025 | U | 0.0025 | U | NC |
| Calcium | mg/l | NA | | NA | | NC | 20 | | 20 | | 0.0% |
| Chromium | mg/l | NA | | NA | | NC | 0.005 | U | 0.005 | U | NC |
| Cobalt | mg/l | NA | | NA | | NC | 0.013 | U | 0.013 | U | NC |
| Copper | mg/l | NA | | NA | | NC | 0.005 | U | 0.005 | U | NC |
| Iron | mg/l | NA | | NA | | NC | 0.41 | | 0.39 | | 5.0% |
| Lead | mg/l | NA | | NA | | NC | 0.009 | U | 0.009 | U | NC |
| Magnesium | mg/l | NA | | NA | | NC | 18 | | 18 | | 0.0% |
| Manganese | mg/l | NA | | NA | | NC | 0.0069 | J | 0.0068 | J | 1.5% |
| Mercury | mg/l | NA | | NA | | NC | 0.0001 | U | 0.0001 | U | NC |
| Nickel | mg/l | NA | | NA | | NC | 0.008 | U | 0.008 | U | NC |
| Potassium | mg/l | NA | | NA | | NC | 19 | | 19 | | 0.0% |
| Selenium | mg/l | NA | | NA | | NC | 0.017 | U | 0.017 | U | NC |
| Silver | mg/l | NA | | NA | | NC | 0.005 | U | 0.005 | U | NC |
| Sodium | mg/l | NA | | NA | | NC | 43 | | 43 | | 0.0% |
| Thallium | mg/l | NA | | NA | | NC | 0.025 | U | 0.025 | U | NC |
| Vanadium | mg/l | NA | | NA | | NC | 0.025 | U | 0.025 | U | NC |
| Zinc | mg/l | NA | | NA | | NC | 0.01 | U | 0.01 | U | NC |

**Notes:**
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
NA = not analyzed
NC = not calculated
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table E-2**
**Relative Percent Difference Calculations for Pore Water Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | PW14 | | PW14 | | Relative Percent Difference | PW16 | | PW16 | | Relative Percent Difference | PW18 | | PW18 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PW14-00-002 | | CDL-PW14-01-002 | | | CDL-PW16-00-002 | | CDL-PW16-01-002 | | | CDL-PW18-00-002 | | CDL-PW18-01-002 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,1,2-Trichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,1-Dichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,1-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,2-Dibromoethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,2-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,2-Dichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,2-Dichloropropane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,3-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 1,4-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| 2-Butanone (MEK) | µg/l | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC |
| 2-Hexanone | µg/l | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC |
| Acetone | µg/l | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC |
| Benzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Bromodichloromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Bromoform | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Bromomethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| BTEX Total | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Carbon Disulfide | µg/l | 1.8 | | 2 | | 10.5% | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Carbon Tetrachloride | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Chlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Chloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Chloroform | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Chloromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| cis-1,2-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| cis-1,3-Dichloropropene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Cyclohexane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Dibromochloromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Dichlorodifluoromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Ethylbenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Isopropylbenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Methyl Acetate | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Methyl Tert-Butyl Ether | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Methylcylohexane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Methylene Chloride | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Styrene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Tetrachloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Toluene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| trans-1,2-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| trans-1,3-Dichloropropene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Trichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Trichlorofluoromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Vinyl Chloride | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| Xylenes (Total) | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 2,4,5-Trichlorophenol | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 2,4,6-Trichlorophenol | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |

**Table E-2**
**Relative Percent Difference Calculations for Pore Water Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | PW14 | | PW14 | | Relative Percent Difference | PW16 | | PW16 | | Relative Percent Difference | PW18 | | PW18 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PW14-00-002 | | CDL-PW14-01-002 | | | CDL-PW16-00-002 | | CDL-PW16-01-002 | | | CDL-PW18-00-002 | | CDL-PW18-01-002 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| 2,4-Dichlorophenol | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 2,4-Dimethylphenol | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| 2,4-Dinitrophenol | µg/l | 3.2 | UJ | 3.6 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | |
| 2,4-Dinitrotoluene | µg/l | 1 | UJ | 1.1 | UJ | NC | 1 | UJ | 1 | UJ | NC | 1 | UJ | 1 | UJ | NC |
| 2,6-Dinitrotoluene | µg/l | 1 | UJ | 1.1 | UJ | NC | 1 | UJ | 1 | UJ | NC | 1 | UJ | 1 | UJ | NC |
| 2-Chloronaphthalene | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 2-Chlorophenol | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 2-Methylnaphthalene | µg/l | 0.1 | UJ | 0.11 | UJ | NC | 0.1 | UJ | 0.1 | UJ | NC | 0.1 | UJ | 0.1 | UJ | NC |
| 2-Methylphenol | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 2-Nitroaniline | µg/l | 1.6 | UJ | 1.8 | UJ | NC | 1.6 | UJ | 1.6 | UJ | NC | 1.6 | UJ | 1.6 | UJ | NC |
| 2-Nitrophenol | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| 3,3'-Dichlorobenzidine | µg/l | 2 | UJ | 2.2 | UJ | NC | 2 | UJ | 2 | UJ | NC | 2 | UJ | 2 | UJ | NC |
| 3-Nitroaniline | µg/l | 1.6 | UJ | 1.8 | UJ | NC | 1.6 | UJ | 1.6 | UJ | NC | 1.6 | UJ | 1.6 | UJ | NC |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| 4-Chloroaniline | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| 4-Nitroaniline | µg/l | 1.6 | UJ | 1.8 | UJ | NC | 1.6 | UJ | 1.6 | UJ | NC | 1.6 | UJ | 1.6 | UJ | NC |
| 4-Nitrophenol | µg/l | 2 | UJ | 2.2 | UJ | NC | 2 | UJ | 2 | UJ | NC | 2 | UJ | 2 | UJ | NC |
| Acenaphthene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Acenaphthylene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Acetophenone | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| Anthracene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Atrazine | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Benzaldehyde | µg/l | 2 | UJ | 2.2 | UJ | NC | 2 | UJ | 2 | UJ | NC | 2 | UJ | 2 | UJ | NC |
| Benzo(a)Anthracene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Benzo(a)Pyrene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Benzo(b)Fluoranthene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Benzo(g,h,i)Perylene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Benzo(k)Fluoranthene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Benzyl Butyl Phthalate | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 0.75 | J | 0.73 | J | 2.7% |
| Bis-Chloroisopropyl ether | µg/l | 0.4 | U | 0.44 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC |
| Caprolactam | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| Carbazole | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| Chrysene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| m & p Cresol | µg/l | 2 | UJ | 2.2 | UJ | NC | 2 | UJ | 2 | UJ | NC | 2 | UJ | 2 | UJ | NC |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Dibenzofuran | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Diethyl Phthalate | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| Dimethyl Phthalate | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| Di-N-Butylphthalate | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| Di-N-Octylphthalate | µg/l | 4 | UJ | 4.5 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC |
| Fluoranthene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Fluorene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Hexachlorobenzene | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| Hexachlorocyclopentadiene | µg/l | 3.2 | UJ | 3.6 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC |
| Hexachloroethane | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |

**Table E-2**
**Relative Percent Difference Calculations for Pore Water Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | PW14 | | PW14 | | Relative Percent Difference | PW16 | | PW16 | | Relative Percent Difference | PW18 | | PW18 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-PW14-00-002 | | CDL-PW14-01-002 | | | CDL-PW16-00-002 | | CDL-PW16-01-002 | | | CDL-PW18-00-002 | | CDL-PW18-01-002 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Isophorone | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| Naphthalene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Nitrobenzene | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 | UJ | 0.88 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | UJ | 0.8 | UJ | NC |
| N-Nitrosodiphenylamine | µg/l | 0.92 | UJ | 1 | UJ | NC | 0.92 | UJ | 0.92 | UJ | NC | 0.92 | UJ | 0.92 | UJ | NC |
| Pentachlorophenol | µg/l | 1.5 | UJ | 1.7 | UJ | NC | 1.5 | UJ | 1.5 | UJ | NC | 1.5 | UJ | 1.5 | UJ | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | |
| Phenanthrene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| Phenol | µg/l | 0.4 | UJ | 0.44 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | UJ | 0.4 | UJ | NC |
| Pyrene | µg/l | 0.16 | UJ | 0.18 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,4,7,8-HXCDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,6,7,8-HXCDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,7,8,9-HXCDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 2,3,4,6,7,8-HXCDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 2,3,4,7,8-PECDF | pg/l | 33.7 | U | 33.6 | U | NC | 34.7 | U | 33.5 | U | NC | 37.6 | U | 39.5 | U | NC |
| 2,3,7,8-TCDD | pg/l | 6.73 | U | 6.7 | U | NC | 6.92 | U | 6.68 | U | NC | 7.5 | U | 7.87 | U | NC |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 6.73 | U | 6.7 | U | NC | 6.92 | U | 6.68 | U | NC | 7.5 | U | 7.87 | U | NC |
| OCDD | pg/l | 44.9 | J | 57.9 | J | 25.3% | 84.7 | J | 105 | | 21.4% | 74.1 | J | 78.7 | U | NC |
| OCDF | pg/l | 67.3 | U | 67 | U | NC | 69.2 | U | 66.8 | U | NC | 75 | U | 78.7 | U | NC |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0.0135 | | 0.0174 | | 25.2% | 0.0254 | | 0.0314 | | 21.1% | 0.0222 | | 0 | U | NC |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 19.2 | | 19.1 | | 0.5% | 19.8 | | 19.1 | | 3.6% | 21.4 | | 22.5 | | 5.0% |
| **Dissolved Inorganics** | | | | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 | U | 0.2 | U | NC | 0.2 | U | 0.2 | U | NC | 0.2 | U | 0.2 | U | NC |
| Antimony | mg/l | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC |
| Arsenic | mg/l | 0.033 | | 0.034 | | 3.0% | 0.0078 | J | 0.011 | J | 34.0% | 0.018 | | 0.018 | | 0.0% |
| Barium | mg/l | 0.052 | | 0.049 | | 5.9% | 0.015 | J | 0.015 | J | 0.0% | 0.024 | J | 0.026 | | 8.0% |
| Beryllium | mg/l | 0.00023 | J | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.025 | U | 0.0025 | U | NC |
| Cadmium | mg/l | 0.0012 | J | 0.0011 | J | 8.7% | 0.0025 | U | 0.0009 | J | NC | 0.0025 | U | 0.0025 | U | NC |
| Calcium | mg/l | 360 | | 330 | | 8.7% | 320 | | 330 | | 3.1% | 330 | | 340 | | 3.0% |
| Chromium | mg/l | 0.0024 | J | 0.0017 | J | 34.1% | 0.005 | U | 0.005 | U | NC | 0.0034 | J | 0.0031 | J | 9.2% |
| Cobalt | mg/l | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC |
| Copper | mg/l | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC |
| Iron | mg/l | 0.08 | U | 0.08 | U | NC | 0.08 | J | 0.071 | J | 11.9% | 0.043 | J | 0.042 | J | 2.4% |
| Lead | mg/l | 0.009 | U | 0.009 | U | NC | 0.009 | U | 0.009 | U | NC | 0.009 | U | 0.009 | U | NC |
| Magnesium | mg/l | 1100 | | 1000 | | 9.5% | 1000 | | 1000 | | 0.0% | 1200 | | 1200 | | 0.0% |
| Manganese | mg/l | 0.075 | | 0.069 | J | 8.3% | 0.048 | J | 0.05 | J | 4.1% | 0.036 | | 0.034 | | 5.7% |
| Mercury | mg/l | 0.0001 | U | 0.0001 | U | NC | 0.0001 | U | 0.0001 | U | NC | 3.00E-05 | J | 0.0001 | U | NC |
| Nickel | mg/l | 0.0034 | J | 0.008 | U | NC | 0.008 | U | 0.0038 | J | NC | 0.008 | U | 0.008 | U | NC |
| Potassium | mg/l | 340 | | 330 | | 3.0% | 370 | | 380 | | 2.7% | 380 | J | 500 | | 27.3% |
| Selenium | mg/l | 0.017 | U | 0.017 | U | NC | 0.017 | U | 0.017 | U | NC | 0.017 | R | 0.017 | R | NC |
| Silver | mg/l | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | UJ | 0.005 | U | NC |
| Sodium | mg/l | 8800 | | 8800 | | 0.0% | 8600 | | 9000 | | 4.5% | 7500 | J | 22000 | | 98.3% |
| Thallium | mg/l | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC |
| Vanadium | mg/l | 0.0042 | J | 0.0036 | J | 15.4% | 0.0029 | J | 0.0027 | J | 7.1% | 0.025 | U | 0.025 | U | NC |
| Zinc | mg/l | 0.01 | U | 0.01 | U | NC | 0.01 | U | 0.01 | U | NC | 0.0034 | J | 0.013 | J | 117.1% |

**Table E-2**
**Relative Percent Difference Calculations for Pore Water Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Location | | PW14 | PW14 | Relative Percent Difference | PW16 | PW16 | Relative Percent Difference | PW18 | PW18 | Relative Percent Difference |
| Sample # | | CDL-PW14-00-002 | CDL-PW14-01-002 | | CDL-PW16-00-002 | CDL-PW16-01-002 | | CDL-PW18-00-002 | CDL-PW18-01-002 | |
| Parent/Duplicate | | Parent | Duplicate | | Parent | Duplicate | | Parent | Duplicate | |
| Analyte | Units | Result | Result | | Result | Result | | Result | Result | |

**Notes:**

J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
NA = not analyzed
NC = not calculated
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table E-3**
**Relative Percent Difference Calculations for Sediment Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD16 | | SD16 | | Relative Percent Difference | SD17 | | SD17 | | Relative Percent Difference | SD18 | | SD18 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD16-00-001 | | CDL-SD16-01-001 | | | CDL-SD17-00-001 | | CDL-SD17-01-001 | | | CDL-SD18-00-001 | | CDL-SD18-01-001 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Total (T) / Dissolved (D) | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,1,2,2-Tetrachloroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,1,2-Trichloroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,1-Dichloroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,1-Dichloroethene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,2,4-Trichlorobenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,2-Dibromoethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,2-Dichlorobenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,2-Dichloroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,2-Dichloropropane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,3-Dichlorobenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 1,4-Dichlorobenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| 2-Butanone (MEK) | µg/kg | 46 | U | 35 | J | NC | 54 | U | 25 | J | NC | 31 | J | 35 | J | 12.1% |
| 2-Hexanone | µg/kg | 46 | U | 54 | U | NC | 54 | U | 48 | U | NC | 43 | U | 46 | U | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 46 | U | 54 | U | NC | 54 | U | 48 | U | NC | 43 | U | 46 | U | NC |
| Acetone | µg/kg | 120 | J | 160 | J | 28.6% | 110 | J | 120 | | 8.7% | 120 | | 160 | | 28.6% |
| Benzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Bromodichloromethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Bromoform | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Bromomethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| BTEX Total | µg/kg | 46 | U | 54 | U | NC | 54 | U | 48 | U | NC | 43 | U | 46 | U | NC |
| Carbon Disulfide | µg/kg | 72 | | 54 | | 28.6% | 37 | | 26 | J | 34.9% | 180 | | 58 | | 102.5% |
| Carbon Tetrachloride | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Chlorobenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Chloroethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Chloroform | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Chloromethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| cis-1,2-Dichloroethene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| cis-1,3-Dichloropropene | µg/kg | 23 | UJ | 27 | UJ | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Cyclohexane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Dibromochloromethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Dichlorodifluoromethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Ethylbenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Isopropylbenzene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Methyl Acetate | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Methyl Tert-Butyl Ether | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Methylcylohexane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Methylene Chloride | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Styrene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Tetrachloroethene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Toluene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| trans-1,2-Dichloroethene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| trans-1,3-Dichloropropene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Trichloroethene | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Trichlorofluoromethane | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Vinyl Chloride | µg/kg | 23 | U | 27 | U | NC | 27 | U | 24 | U | NC | 22 | U | 23 | U | NC |
| Xylenes (Total) | µg/kg | 46 | U | 54 | U | NC | 54 | U | 48 | U | NC | 43 | U | 46 | U | NC |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2,4,5-Trichlorophenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2,4,6-Trichlorophenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |

**Table E-3**
**Relative Percent Difference Calculations for Sediment Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD16 | | SD16 | | Relative Percent Difference | SD17 | | SD17 | | Relative Percent Difference | SD18 | | SD18 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD16-00-001 | | CDL-SD16-01-001 | | | CDL-SD17-00-001 | | CDL-SD17-01-001 | | | CDL-SD18-00-001 | | CDL-SD18-01-001 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Total (T) / Dissolved (D) | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| 2,4-Dichlorophenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2,4-Dimethylphenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2,4-Dinitrophenol | µg/kg | 2400 | U | 2400 | U | NC | 2400 | U | 2600 | U | NC | 2300 | U | 2400 | U | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | |
| 2,4-Dinitrotoluene | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2,6-Dinitrotoluene | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2-Chloronaphthalene | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2-Chlorophenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2-Methylnaphthalene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| 2-Methylphenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2-Nitroaniline | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 2-Nitrophenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 3,3'-Dichlorobenzidine | µg/kg | 600 | U | 600 | U | NC | 600 | U | 640 | U | NC | 560 | U | 580 | U | NC |
| 3-Nitroaniline | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 2400 | U | 2400 | U | NC | 2400 | U | 2600 | U | NC | 2300 | U | 2400 | U | NC |
| 4-Bromophenyl Phenyl Ether | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 4-Chloro-3-Methylphenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 4-Chloroaniline | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 4-Nitroaniline | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| 4-Nitrophenol | µg/kg | 2400 | U | 2400 | U | NC | 2400 | U | 2600 | U | NC | 2300 | U | 2400 | U | NC |
| Acenaphthene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Acenaphthylene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Acetophenone | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Anthracene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Atrazine | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Benzaldehyde | µg/kg | 490 | U | 490 | U | NC | 490 | U | 520 | U | NC | 460 | U | 470 | U | NC |
| Benzo(a)Anthracene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Benzo(a)Pyrene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Benzo(b)Fluoranthene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Benzo(g,h,i)Perylene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Benzo(k)Fluoranthene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Benzyl Butyl Phthalate | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Bis(2-Chloroethoxy)Methane | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Bis(2-Chloroethyl) Ether | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Bis-Chloroisopropyl ether | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Caprolactam | µg/kg | 490 | U | 490 | U | NC | 490 | U | 520 | U | NC | 460 | U | 470 | U | NC |
| Carbazole | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Chrysene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| m & p Cresol | µg/kg | 480 | U | 500 | U | NC | 480 | U | 520 | U | NC | 460 | U | 460 | U | NC |
| Dibenzo(a,h)Anthracene | µg/kg | 60 | UJ | 60 | UJ | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Dibenzofuran | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Diethyl Phthalate | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Dimethyl Phthalate | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Di-N-Butylphthalate | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Di-N-Octylphthalate | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Fluoranthene | µg/kg | 17 | J | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Fluorene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Hexachloro-1,3-Butadiene | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Hexachlorobenzene | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Hexachlorocyclopentadiene | µg/kg | 2400 | R | 2400 | R | NC | 2400 | U | 2600 | U | NC | 2300 | U | 2400 | U | NC |
| Hexachloroethane | µg/kg | 490 | UJ | 490 | UJ | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |

**Table E-3**
**Relative Percent Difference Calculations for Sediment Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD16 | | SD16 | | Relative Percent Difference | SD17 | | SD17 | | Relative Percent Difference | SD18 | | SD18 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD16-00-001 | | CDL-SD16-01-001 | | | CDL-SD17-00-001 | | CDL-SD17-01-001 | | | CDL-SD18-00-001 | | CDL-SD18-01-001 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Total (T) / Dissolved (D) | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Isophorone | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Naphthalene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Nitrobenzene | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| N-Nitroso-Di-N-Propylamine | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| N-Nitrosodiphenylamine | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Pentachlorophenol | µg/kg | 980 | U | 980 | U | NC | 980 | U | 1000 | U | NC | 910 | U | 940 | U | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | |
| Phenanthrene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| Phenol | µg/kg | 490 | U | 490 | U | NC | 490 | U | 530 | U | NC | 450 | U | 450 | U | NC |
| Pyrene | µg/kg | 60 | U | 60 | U | NC | 60 | U | 65 | U | NC | 55 | U | 55 | U | NC |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | 46.3 | | 117 | | 86.6% | 5.27 | U | 2.75 | J | NC | 5.54 | J | 16 | | 97.1% |
| 1,2,3,4,6,7,8-HPCDF | pg/g | 4.22 | U | 3.54 | J | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,4,7,8,9-HPCDF | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | 4.22 | U | 3.13 | J | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,4,7,8-HXCDF | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | 4.22 | U | 5.38 | J | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,6,7,8-HXCDF | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | 3.36 | J | 8.17 | | 83.4% | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,7,8,9-HXCDF | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 2,3,4,6,7,8-HXCDF | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 2,3,4,7,8-PECDF | pg/g | 4.22 | U | 4.95 | U | NC | 5.27 | U | 5.23 | U | NC | 4.29 | U | 4.45 | U | NC |
| 2,3,7,8-TCDD | pg/g | 0.841 | U | 0.987 | U | NC | 1.05 | U | 1.04 | U | NC | 0.856 | U | 0.887 | U | NC |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | 0.783 | J | 1.47 | J | 61.0% | 1.05 | U | 1.04 | U | NC | 0.856 | U | 0.479 | J | NC |
| OCDD | pg/g | 804 | | 2020 | | 86.1% | 32.7 | | 48.6 | | 39.1% | 93.5 | | 269 | | 96.8% |
| OCDF | pg/g | 8.41 | U | 9.87 | U | NC | 10.5 | U | 10.4 | U | NC | 8.56 | U | 8.87 | U | NC |
| Total TEQ (WHO 2005) ND = 0 | pg/g | 1.12 | | 3.62 | | 105.5% | 0.0098 | | 0.042 | | 124.3% | 0.0835 | | 0.289 | | 110.3% |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | 3.38 | | 6.02 | | 56.2% | 3.01 | | 3.01 | | 0.0% | 2.51 | | 2.79 | | 10.6% |
| **Inorganics** | | | | | | | | | | | | | | | | |
| Aluminum | mg/kg | 21000 | | 22000 | | 4.7% | 18000 | | 21000 | | 15.4% | 18000 | | 20000 | | 10.5% |
| Antimony | mg/kg | 2 | U | 2.3 | U | NC | 2 | U | 2.6 | U | NC | 1.5 | R | 1.8 | R | NC |
| Arsenic | mg/kg | 8.5 | | 8.5 | | 0.0% | 7.4 | | 9 | | 19.5% | 7.6 | J | 8.1 | J | 6.4% |
| Barium | mg/kg | 47 | | 48 | | 2.1% | 39 | | 44 | | 12.0% | 40 | J | 44 | J | 9.5% |
| Beryllium | mg/kg | 0.57 | J | 0.61 | J | 6.8% | 0.48 | J | 0.54 | J | 11.8% | 0.25 | J | 0.28 | J | 11.3% |
| Cadmium | mg/kg | 0.3 | J | 0.28 | J | 6.9% | 0.25 | J | 0.3 | J | 18.2% | 0.16 | J | 0.17 | J | 6.1% |
| Calcium | mg/kg | 2800 | | 3000 | | 6.9% | 2600 | | 3000 | | 14.3% | 2700 | | 3400 | | 23.0% |
| Chromium | mg/kg | 45 | | 49 | | 8.5% | 38 | | 46 | | 19.0% | 37 | J | 41 | J | 10.3% |
| Cobalt | mg/kg | 6.3 | | 7 | | 10.5% | 5.3 | | 6.5 | | 20.3% | 5.4 | J | 6 | J | 10.5% |
| Copper | mg/kg | 18 | | 18 | | 0.0% | 14 | | 17 | | 19.4% | 14 | J | 15 | J | 6.9% |
| Iron | mg/kg | 25000 | | 27000 | | 7.7% | 21000 | | 26000 | | 21.3% | 22000 | | 25000 | | 12.8% |
| Lead | mg/kg | 19 | | 20 | | 5.1% | 15 | | 19 | | 23.5% | 14 | J | 16 | J | 13.3% |
| Magnesium | mg/kg | 8600 | | 9100 | | 5.6% | 7600 | | 8800 | | 14.6% | 8100 | J | 9300 | J | 13.8% |
| Manganese | mg/kg | 200 | | 220 | | 9.5% | 170 | | 200 | | 16.2% | 170 | | 190 | | 11.1% |
| Mercury | mg/kg | 0.1 | J | 0.12 | J | 18.2% | 0.11 | J | 0.11 | J | 0.0% | 0.11 | J | 0.1 | J | 9.5% |
| Nickel | mg/kg | 20 | | 22 | | 9.5% | 17 | | 21 | | 21.1% | 17 | J | 19 | J | 11.1% |
| Potassium | mg/kg | 5200 | | 5400 | | 3.8% | 4500 | | 5100 | | 12.5% | 4600 | J | 5100 | J | 10.3% |
| Selenium | mg/kg | 2.2 | U | 2.5 | U | NC | 2.1 | U | 2.8 | U | NC | 1.6 | UJ | 1.9 | UJ | NC |
| Silver | mg/kg | 0.7 | U | 0.8 | U | NC | 0.65 | U | 0.85 | U | NC | 0.5 | UJ | 0.6 | UJ | NC |
| Sodium | mg/kg | 20000 | | 21000 | | 4.9% | 21000 | | 23000 | | 9.1% | 21000 | J | 24000 | J | 13.3% |
| Thallium | mg/kg | 3.4 | U | 3.9 | U | NC | 3.3 | U | 4.4 | U | NC | 2.5 | UJ | 3 | UJ | NC |
| Vanadium | mg/kg | 50 | | 54 | | 7.7% | 42 | | 50 | | 17.4% | 42 | J | 46 | J | 9.1% |
| Zinc | mg/kg | 110 | | 86 | | 24.5% | 67 | | 83 | | 21.3% | 63 | J | 71 | J | 11.9% |

**Table E-3**
**Relative Percent Difference Calculations for Sediment Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | SD16 | SD16 | Relative Percent Difference | SD17 | SD17 | Relative Percent Difference | SD18 | SD18 | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-SD16-00-001 | CDL-SD16-01-001 | | CDL-SD17-00-001 | CDL-SD17-01-001 | | CDL-SD18-00-001 | CDL-SD18-01-001 | |
| Parent/Duplicate | | Parent | Duplicate | | Parent | Duplicate | | Parent | Duplicate | |
| Total (T) / Dissolved (D) | Units | Result | Result | | Result | Result | | Result | Result | |

**Notes:**

NC = not calculated
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT5 | | DPT5 | | Relative Percent Difference | DPT8 | | DPT8 | | Relative Percent Difference | DPT9 | | DPT9 | | Relative Percent Difference | TP20B | | TP20B | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS05-00-026 | | CDL-DPS05-01-026 | | | CDL-DPS08-00-010 | | CDL-DPS08-01-010 | | | CDL-DPS09-00-035 | | CDL-DPS09-01-035 | | | CDL-TP20B-00-010 | | CDL-TP20B-01-010 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,1,2,2-Tetrachloroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,1,2-Trichloroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| 1,1-Dichloroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,1-Dichloroethene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| 1,2,4-Trichlorobenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| 1,2-Dibromoethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,2-Dichlorobenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,2-Dichloroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,2-Dichloropropane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,3-Dichlorobenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 1,4-Dichlorobenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| 2-Butanone (MEK) | µg/kg | 8.8 | U | 8.8 | U | NC | 14 | U | 7.9 | J | NC | 8.8 | U | 8.8 | U | NC | 19 | | 25 | | 27.3% |
| 2-Hexanone | µg/kg | 8.8 | U | 8.8 | U | NC | 14 | U | 12 | U | NC | 8.8 | U | 8.8 | U | NC | 15 | U | 12 | U | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 8.8 | U | 8.8 | U | NC | 14 | U | 12 | U | NC | 8.8 | U | 8.8 | U | NC | 15 | U | 12 | U | NC |
| Acetone | µg/kg | 9.2 | U | 8.8 | U | NC | 25 | J | 35 | | 33.3% | 8.8 | U | 8.8 | U | NC | 69 | | 84 | | 19.6% |
| Benzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Bromodichloromethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Bromoform | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Bromomethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| BTEX Total | µg/kg | 1.9 | | 1.7 | | 11.1% | 15 | U | 12 | U | NC | 1.7 | | 1.8 | | 5.7% | 15 | U | 12 | U | NC |
| Carbon Disulfide | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Carbon Tetrachloride | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Chlorobenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Chloroethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Chloroform | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Chloromethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| cis-1,2-Dichloroethene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| cis-1,3-Dichloropropene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Cyclohexane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Dibromochloromethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Dichlorodifluoromethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Ethylbenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Isopropylbenzene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Methyl Acetate | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Methyl Tert-Butyl Ether | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Methylcylohexane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Methylene Chloride | µg/kg | 4.6 | U | 4.5 | U | NC | 2.9 | J | 2.6 | J | 10.9% | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Styrene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Tetrachloroethene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Toluene | µg/kg | 1.9 | J | 1.7 | J | 11.1% | 7.3 | U | 6 | U | NC | 1.7 | J | 1.8 | J | 5.7% | 7.6 | UJ | 6.2 | UJ | NC |
| trans-1,2-Dichloroethene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| trans-1,3-Dichloropropene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Trichloroethene | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | UJ | 6.2 | UJ | NC |
| Trichlorofluoromethane | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT5 | | DPT5 | | Relative Percent Difference | DPT8 | | DPT8 | | Relative Percent Difference | DPT9 | | DPT9 | | Relative Percent Difference | TP20B | | TP20B | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS05-00-026 | | CDL-DPS05-01-026 | | | CDL-DPS08-00-010 | | CDL-DPS08-01-010 | | | CDL-DPS09-00-035 | | CDL-DPS09-01-035 | | | CDL-TP20B-00-010 | | CDL-TP20B-01-010 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Vinyl Chloride | µg/kg | 4.6 | U | 4.5 | U | NC | 7.3 | U | 6 | U | NC | 4.3 | U | 4.5 | U | NC | 7.6 | U | 6.2 | U | NC |
| Xylenes (Total) | µg/kg | 9.1 | U | 9 | U | NC | 15 | U | 12 | U | NC | 8.6 | U | 9 | U | NC | 15 | U | 12 | U | NC |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2,4,5-Trichlorophenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2,4,6-Trichlorophenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2,4-Dichlorophenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2,4-Dimethylphenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2,4-Dinitrophenol | µg/kg | 720 | U | 720 | U | NC | 890 | U | 890 | U | NC | 700 | U | 700 | U | NC | 980 | U | 980 | U | NC |
| 2,4-Dinitrotoluene | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2,6-Dinitrotoluene | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2-Chloronaphthalene | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2-Chlorophenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2-Methylnaphthalene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 24 | J | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| 2-Methylphenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2-Nitroaniline | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 2-Nitrophenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 3,3'-Dichlorobenzidine | µg/kg | 180 | UJ | 180 | UJ | NC | 220 | U | 220 | U | NC | 170 | UJ | 170 | UJ | NC | 240 | U | 240 | U | NC |
| 3-Nitroaniline | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 720 | UJ | 720 | UJ | NC | 890 | U | 890 | U | NC | 700 | UJ | 700 | UJ | NC | 980 | U | 980 | U | NC |
| 4-Bromophenyl Phenyl Ether | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 4-Chloro-3-Methylphenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 4-Chloroaniline | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 4-Nitroaniline | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| 4-Nitrophenol | µg/kg | 720 | U | 720 | U | NC | 890 | U | 890 | U | NC | 700 | U | 700 | U | NC | 980 | U | 980 | U | NC |
| Acenaphthene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Acenaphthylene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Acetophenone | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Anthracene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Atrazine | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Benzaldehyde | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 200 | U | 45 | J | NC |
| Benzo(a)Anthracene | µg/kg | 18 | U | 18 | U | NC | 28 | J | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Benzo(a)Pyrene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 44 | J | 24 | U | NC |
| Benzo(b)Fluoranthene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Benzo(g,h,i)Perylene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Benzo(k)Fluoranthene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Benzyl Butyl Phthalate | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Bis(2-Chloroethoxy)Methane | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Bis(2-Chloroethyl) Ether | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 140 | UJ | 140 | UJ | NC | 130 | J | 180 | U | NC | 110 | J | 110 | J | 0.0% | 190 | U | 200 | U | NC |
| Bis-Chloroisopropyl ether | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Caprolactam | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 200 | U | 200 | U | NC |
| Carbazole | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Chrysene | µg/kg | 18 | U | 18 | U | NC | 14 | J | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| m & p Cresol | µg/kg | 140 | U | 150 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Dibenzo(a,h)Anthracene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Dibenzofuran | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT5 | | DPT5 | | Relative Percent Difference | DPT8 | | DPT8 | | Relative Percent Difference | DPT9 | | DPT9 | | Relative Percent Difference | TP20B | | TP20B | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS05-00-026 | | CDL-DPS05-01-026 | | | CDL-DPS08-00-010 | | CDL-DPS08-01-010 | | | CDL-DPS09-00-035 | | CDL-DPS09-01-035 | | | CDL-TP20B-00-010 | | CDL-TP20B-01-010 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Diethyl Phthalate | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Dimethyl Phthalate | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Di-N-Butylphthalate | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Di-N-Octylphthalate | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | | | | | | |
| Fluoranthene | µg/kg | 18 | U | 18 | U | NC | 18 | J | 22 | U | NC | 17 | U | 17 | U | NC | 29 | J | 26 | J | 10.9% |
| Fluorene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Hexachloro-1,3-Butadiene | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Hexachlorobenzene | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Hexachlorocyclopentadiene | µg/kg | 720 | U | 720 | U | NC | 890 | R | 890 | R | NC | 700 | U | 700 | U | NC | 980 | UJ | 980 | U | NC |
| Hexachloroethane | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Isophorone | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Naphthalene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 23 | U | 24 | U | NC |
| Nitrobenzene | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| N-Nitroso-Di-N-Propylamine | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| N-Nitrosodiphenylamine | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Pentachlorophenol | µg/kg | 290 | U | 290 | U | NC | 360 | U | 360 | U | NC | 280 | U | 280 | U | NC | 390 | U | 390 | U | NC |
| Phenanthrene | µg/kg | 18 | U | 18 | U | NC | 26 | J | 29 | J | 10.9% | 17 | U | 17 | U | NC | 23 | U | 24 | J | NC |
| Phenol | µg/kg | 140 | U | 140 | U | NC | 180 | U | 180 | U | NC | 140 | U | 140 | U | NC | 190 | U | 200 | U | NC |
| Pyrene | µg/kg | 18 | U | 18 | U | NC | 22 | U | 22 | U | NC | 17 | U | 17 | U | NC | 22 | J | 24 | J | 8.7% |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 46.6 | J | 59.5 | J | 24.3% |
| 1,2,3,4,6,7,8-HPCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 9.11 | | 14.4 | J | 45.0% |
| 1,2,3,4,7,8,9-HPCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 3.23 | U | NC |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 3.23 | U | NC |
| 1,2,3,4,7,8-HXCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 1.79 | J | NC |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 2.23 | J | NC |
| 1,2,3,6,7,8-HXCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 3.23 | U | NC |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 1.83 | J | 2.2 | J | 18.4% |
| 1,2,3,7,8,9-HXCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 3.23 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 3.23 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 3.23 | U | NC |
| 2,3,4,6,7,8-HXCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.27 | U | 2.04 | J | NC |
| 2,3,4,7,8-PECDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 1.69 | J | 1.65 | J | 2.4% |
| 2,3,7,8-TCDD | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 0.652 | U | 0.645 | U | NC |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 2.3 | J | 2.5 | J | 8.3% |
| OCDD | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 2960 | J | 3750 | J | 23.5% |
| OCDF | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 6.4 | J | 10.3 | | 46.7% |
| Total TEQ (WHO 2005) ND = 0 | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 2.37 | | 3.45 | | 37.1% |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | 3.87 | | 4.69 | | 19.2% |
| **Inorganics** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | mg/kg | 3700 | | 3600 | | 2.7% | 26000 | | 37000 | | 34.9% | 4800 | | 4300 | | 11.0% | 17000 | | 20000 | | 16.2% |
| Antimony | mg/kg | 0.83 | U | 0.83 | U | NC | 30 | J | 8.5 | J | 111.7% | 0.71 | U | 0.72 | U | NC | 2.5 | J | 3.6 | J | 36.1% |
| Arsenic | mg/kg | 0.75 | J | 0.63 | J | 17.4% | 31 | J | 9.3 | J | 107.7% | 0.91 | | 1 | | 9.4% | 9.7 | J | 8.5 | | 13.2% |
| Barium | mg/kg | 9.5 | | 9.5 | | 0.0% | 86 | | 89 | | 3.4% | 10 | | 9.2 | | 8.3% | 64 | | 62 | | 3.2% |
| Beryllium | mg/kg | 0.035 | J | 0.031 | J | 12.1% | 0.45 | J | 0.58 | J | 25.2% | 0.068 | J | 0.06 | J | 12.5% | 0.34 | J | 0.41 | J | 18.7% |
| Cadmium | mg/kg | 0.11 | U | 0.11 | U | NC | 17 | | 24 | | 34.1% | 0.052 | J | 0.058 | J | 10.9% | 5.3 | | 7.4 | | 33.1% |

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPT5 | | DPT5 | | Relative Percent Difference | DPT8 | | DPT8 | | Relative Percent Difference | DPT9 | | DPT9 | | Relative Percent Difference | TP20B | | TP20B | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPS05-00-026 | | CDL-DPS05-01-026 | | | CDL-DPS08-00-010 | | CDL-DPS08-01-010 | | | CDL-DPS09-00-035 | | CDL-DPS09-01-035 | | | CDL-TP20B-00-010 | | CDL-TP20B-01-010 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Calcium | mg/kg | 140 | U | 140 | U | NC | 1600 | J | 1800 | J | 11.8% | 120 | U | 120 | U | NC | 2200 | | 2500 | | 12.8% |
| Chromium | mg/kg | 4 | | 4 | | 0.0% | 88 | J | 140 | J | 45.6% | 12 | | 12 | | 0.0% | 39 | | 58 | | 39.2% |
| Cobalt | mg/kg | 0.76 | J | 0.5 | J | 41.3% | 16 | | 7.3 | J | 74.7% | 0.74 | J | 0.69 | J | 7.0% | 3.2 | J | 3 | J | 6.5% |
| Copper | mg/kg | 1.8 | J | 1.6 | J | 11.8% | 6700 | | 4200 | | 45.9% | 5 | | 5 | | 0.0% | 740 | | 1200 | | 47.4% |
| Iron | mg/kg | 1800 | | 1800 | | 0.0% | 160000 | J | 14000 | J | 167.8% | 3100 | | 2900 | | 6.7% | 8900 | | 11000 | | 21.1% |
| Lead | mg/kg | 3.1 | | 2.6 | | 17.5% | 780 | J | 680 | J | 13.7% | 2.9 | | 2.9 | | 0.0% | 190 | | 310 | | 48.0% |
| **Inorganics Continued** | | | | | | | | | | | | | | | | | | | | | |
| Magnesium | mg/kg | 130 | J | 130 | J | 0.0% | 1800 | J | 2500 | J | 32.6% | 260 | | 230 | J | 12.2% | 1400 | | 1500 | | 6.9% |
| Manganese | mg/kg | 29 | | 20 | | 36.7% | 710 | J | 360 | J | 65.4% | 33 | | 30 | | 9.5% | 140 | | 210 | | 40.0% |
| Mercury | mg/kg | 0.043 | U | 0.046 | U | NC | 0.13 | | 0.063 | J | 69.4% | 0.039 | U | 0.04 | U | NC | 0.19 | | 0.22 | | 14.6% |
| Nickel | mg/kg | 1.4 | J | 1.3 | J | 7.4% | 94 | J | 81 | J | 14.9% | 3 | | 2.8 | | 6.9% | 27 | J | 50 | J | 59.7% |
| Potassium | mg/kg | 140 | U | 140 | U | NC | 750 | U | 800 | U | NC | 120 | U | 120 | U | NC | 590 | J | 500 | J | 16.5% |
| Selenium | mg/kg | 0.88 | U | 0.88 | U | NC | 4.9 | U | 5 | U | NC | 0.76 | U | 0.77 | U | NC | 2.1 | U | 1.5 | J | NC |
| Silver | mg/kg | 0.27 | U | 0.28 | U | NC | 16 | | 24 | | 40.0% | 0.24 | U | 0.24 | U | NC | 5.1 | | 8.6 | | 51.1% |
| Sodium | mg/kg | 140 | U | 140 | U | NC | 750 | U | 800 | U | NC | 32 | J | 32 | J | 0.0% | 80 | J | 80 | J | 0.0% |
| Thallium | mg/kg | 1.4 | U | 1.4 | U | NC | 7.5 | U | 8 | U | NC | 1.2 | U | 1.2 | U | NC | 3.3 | U | 3.6 | U | NC |
| Vanadium | mg/kg | 4.2 | | 4.2 | | 0.0% | 25 | | 21 | | 17.4% | 5.6 | | 5.1 | | 9.3% | 17 | | 15 | | 12.5% |
| Zinc | mg/kg | 16 | | 17 | | 6.1% | 1100 | | 950 | | 14.6% | 32 | | 32 | | 0.0% | 310 | J | 320 | J | 3.2% |

**Notes:**
NC = not calculated
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | TP24A | | TP24A | | Relative Percent Difference | TP27A | | TP27A | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-TP24A-00-012 | | CDL-TP24A-01-012 | | | CDL-TP27A-00-004 | | CDL-TP27A-01-004 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,1,2,2-Tetrachloroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,1,2-Trichloroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,1-Dichloroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | U | NC |
| 1,1-Dichloroethene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,2,4-Trichlorobenzene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | UJ | 3.4 | UJ | NC |
| 1,2-Dibromo-3-Chloropropane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,2-Dibromoethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,2-Dichlorobenzene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,2-Dichloroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,2-Dichloropropane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| 1,3-Dichlorobenzene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | UJ | 3.4 | UJ | NC |
| 1,4-Dichlorobenzene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | UJ | 3.4 | UJ | NC |
| 2-Butanone (MEK) | µg/kg | 7.5 | U | 7.6 | U | NC | 8.8 | U | 6.9 | UJ | NC |
| 2-Hexanone | µg/kg | 7.5 | U | 7.6 | U | NC | 8.8 | U | 6.9 | UJ | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/kg | 7.5 | U | 7.6 | U | NC | 8.8 | U | 6.9 | UJ | NC |
| Acetone | µg/kg | 44 | J | 83 | J | 61.4% | 8.8 | U | 6.8 | UJ | NC |
| Benzene | µg/kg | 410 | | 550 | | 29.2% | 4.3 | U | 1.4 | J | NC |
| Bromodichloromethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Bromoform | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Bromomethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| BTEX Total | µg/kg | 12310 | | 20750 | | 51.1% | 8.6 | U | 1.4 | | NC |
| Carbon Disulfide | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Carbon Tetrachloride | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Chlorobenzene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Chloroethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Chloroform | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Chloromethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| cis-1,2-Dichloroethene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| cis-1,3-Dichloropropene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Cyclohexane | µg/kg | 220 | | 190 | | 14.6% | 4.3 | U | 3.4 | UJ | NC |
| Dibromochloromethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Dichlorodifluoromethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Ethylbenzene | µg/kg | 1300 | J | 2300 | J | 55.6% | 4.3 | U | 3.4 | UJ | NC |
| Isopropylbenzene | µg/kg | 43 | | 44 | | 2.3% | 4.3 | U | 3.4 | UJ | NC |
| Methyl Acetate | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Methyl Tert-Butyl Ether | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Methylcylohexane | µg/kg | 1300 | J | 2300 | J | 55.6% | 4.3 | U | 3.4 | UJ | NC |
| Methylene Chloride | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Styrene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Tetrachloroethene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | UJ | 3.4 | UJ | NC |
| Toluene | µg/kg | 1200 | | 1900 | | 45.2% | 4.3 | U | 3.4 | UJ | NC |
| trans-1,2-Dichloroethene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| trans-1,3-Dichloropropene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Trichloroethene | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Trichlorofluoromethane | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | TP24A | | TP24A | | Relative Percent Difference | TP27A | | TP27A | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-TP24A-00-012 | | CDL-TP24A-01-012 | | | CDL-TP27A-00-004 | | CDL-TP27A-01-004 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | |
| Vinyl Chloride | µg/kg | 3.8 | U | 3.8 | U | NC | 4.3 | U | 3.4 | UJ | NC |
| Xylenes (Total) | µg/kg | 9400 | J | 16000 | J | 52.0% | 8.6 | U | 6.9 | UJ | NC |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2,4,5-Trichlorophenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2,4,6-Trichlorophenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2,4-Dichlorophenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2,4-Dimethylphenol | µg/kg | 68 | J | 150 | U | NC | 160 | U | 140 | U | NC |
| 2,4-Dinitrophenol | µg/kg | 770 | U | 760 | U | NC | 810 | U | 670 | U | NC |
| 2,4-Dinitrotoluene | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2,6-Dinitrotoluene | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2-Chloronaphthalene | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2-Chlorophenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2-Methylnaphthalene | µg/kg | 93 | J | 87 | J | 6.7% | 20 | U | 17 | U | NC |
| 2-Methylphenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2-Nitroaniline | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 2-Nitrophenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 3,3'-Dichlorobenzidine | µg/kg | 190 | U | 190 | U | NC | 200 | U | 160 | U | NC |
| 3-Nitroaniline | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 4,6-Dinitro-2-Methylphenol | µg/kg | 770 | U | 760 | U | NC | 810 | U | 670 | U | NC |
| 4-Bromophenyl Phenyl Ether | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 4-Chloro-3-Methylphenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 4-Chloroaniline | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 4-Chlorophenyl Phenyl Ether | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 4-Nitroaniline | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| 4-Nitrophenol | µg/kg | 770 | U | 760 | U | NC | 810 | U | 670 | U | NC |
| Acenaphthene | µg/kg | 160 | J | 170 | J | 6.1% | 20 | U | 17 | U | NC |
| Acenaphthylene | µg/kg | 38 | J | 77 | J | 67.8% | 20 | U | 17 | U | NC |
| Acetophenone | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Anthracene | µg/kg | 260 | J | 390 | | 40.0% | 20 | U | 17 | U | NC |
| Atrazine | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Benzaldehyde | µg/kg | 150 | U | 150 | U | NC | 160 | U | 130 | U | NC |
| Benzo(a)Anthracene | µg/kg | 710 | | 540 | | 27.2% | 17 | J | 17 | U | NC |
| Benzo(a)Pyrene | µg/kg | 870 | | 660 | | 27.5% | 10 | J | 17 | U | NC |
| Benzo(b)Fluoranthene | µg/kg | 1200 | | 890 | | 29.7% | 15 | J | 17 | U | NC |
| Benzo(g,h,i)Perylene | µg/kg | 450 | | 310 | J | 36.8% | 20 | U | 10 | J | NC |
| Benzo(k)Fluoranthene | µg/kg | 480 | | 360 | J | 28.6% | 20 | U | 17 | U | NC |
| Benzyl Butyl Phthalate | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Bis(2-Chloroethoxy)Methane | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Bis(2-Chloroethyl) Ether | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Bis-Chloroisopropyl ether | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Caprolactam | µg/kg | 150 | U | 150 | U | NC | 160 | U | 130 | U | NC |
| Carbazole | µg/kg | 60 | J | 100 | J | 50.0% | 160 | U | 140 | U | NC |
| Chrysene | µg/kg | 800 | | 580 | | 31.9% | 20 | U | 17 | U | NC |
| m & p Cresol | µg/kg | 160 | U | 150 | U | NC | 170 | U | 130 | U | NC |
| Dibenzo(a,h)Anthracene | µg/kg | 19 | U | 19 | U | NC | 20 | U | 17 | U | NC |
| Dibenzofuran | µg/kg | 110 | J | 130 | J | 16.7% | 160 | U | 140 | U | NC |

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | TP24A | | TP24A | | Relative Percent Difference | TP27A | | TP27A | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-TP24A-00-012 | | CDL-TP24A-01-012 | | | CDL-TP27A-00-004 | | CDL-TP27A-01-004 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | |
| Diethyl Phthalate | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Dimethyl Phthalate | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Di-N-Butylphthalate | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Di-N-Octylphthalate | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | |
| Fluoranthene | µg/kg | 1700 | | 1700 | | 0.0% | 26 | J | 17 | U | NC |
| Fluorene | µg/kg | 200 | J | 230 | J | 14.0% | 20 | U | 17 | U | NC |
| Hexachloro-1,3-Butadiene | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Hexachlorobenzene | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Hexachlorocyclopentadiene | µg/kg | 770 | U | 760 | U | NC | 810 | U | 670 | U | NC |
| Hexachloroethane | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Indeno(1,2,3-cd)Pyrene | µg/kg | 400 | | 310 | J | 25.4% | 20 | U | 17 | U | NC |
| Isophorone | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Naphthalene | µg/kg | 540 | | 500 | | 7.7% | 20 | U | 17 | U | NC |
| Nitrobenzene | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| N-Nitroso-Di-N-Propylamine | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| N-Nitrosodiphenylamine | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Pentachlorophenol | µg/kg | 310 | U | 310 | U | NC | 330 | U | 270 | U | NC |
| Phenanthrene | µg/kg | 1500 | | 1900 | | 23.5% | 20 | U | 17 | U | NC |
| Phenol | µg/kg | 160 | U | 150 | U | NC | 160 | U | 140 | U | NC |
| Pyrene | µg/kg | 1200 | | 1100 | | 8.7% | 22 | J | 17 | U | NC |
| **Dioxins/Furans** | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/g | NA | | NA | | NC | 289 | | 208 | | 32.6% |
| 1,2,3,4,6,7,8-HPCDF | pg/g | NA | | NA | | NC | 45.4 | J | 41.2 | J | 9.7% |
| 1,2,3,4,7,8,9-HPCDF | pg/g | NA | | NA | | NC | 3.32 | J | 3.3 | J | 0.6% |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | 5.71 | | 4.6 | | 21.5% |
| 1,2,3,4,7,8-HXCDF | pg/g | NA | | NA | | NC | 10 | | 10.8 | | 7.7% |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | 12.9 | | 9.75 | | 27.8% |
| 1,2,3,6,7,8-HXCDF | pg/g | NA | | NA | | NC | 9.48 | | 9.64 | | 1.7% |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | 11.6 | | 8.83 | | 27.1% |
| 1,2,3,7,8,9-HXCDF | pg/g | NA | | NA | | NC | 2.8 | J | 2.79 | J | 0.4% |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/g | NA | | NA | | NC | 7.21 | | 7.9 | | 9.1% |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/g | NA | | NA | | NC | 5.16 | | 4.46 | | 14.6% |
| 2,3,4,6,7,8-HXCDF | pg/g | NA | | NA | | NC | 13 | | 12.8 | | 1.6% |
| 2,3,4,7,8-PECDF | pg/g | NA | | NA | | NC | 13.9 | | 13.7 | | 1.4% |
| 2,3,7,8-TCDD | pg/g | NA | | NA | | NC | 1.38 | | 1.2 | | 14.0% |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/g | NA | | NA | | NC | 12.7 | | 14.1 | J | 10.4% |
| OCDD | pg/g | NA | | NA | | NC | 12600 | J | 8950 | J | 33.9% |
| OCDF | pg/g | NA | | NA | | NC | 24.1 | | 22 | | 9.1% |
| Total TEQ (WHO 2005) ND = 0 | pg/g | NA | | NA | | NC | 25.8 | | 22.5 | | 13.7% |
| Total TEQ (WHO 2005) ND = 0.5 | pg/g | NA | | NA | | NC | 25.8 | | 22.5 | | 13.7% |
| **Inorganics** | | | | | | | | | | | |
| Aluminum | mg/kg | 13000 | | 11000 | | 16.7% | 11000 | | 11000 | | 0.0% |
| Antimony | mg/kg | 0.59 | J | 1.7 | U | NC | 6.8 | J | 2.8 | J | 83.3% |
| Arsenic | mg/kg | 6.9 | | 6.7 | | 2.9% | 8.4 | | 4.7 | | 56.5% |
| Barium | mg/kg | 57 | | 52 | | 9.2% | 710 | J | 280 | J | 86.9% |
| Beryllium | mg/kg | 0.26 | J | 0.24 | J | 8.0% | 0.14 | U | 0.12 | U | NC |
| Cadmium | mg/kg | 0.91 | J | 3.2 | J | 111.4% | 3.4 | | 1.1 | | 102.2% |

**Table E-4**
**Relative Percent Difference Calculations for Soil Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | TP24A | | TP24A | | Relative Percent Difference | TP27A | | TP27A | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-TP24A-00-012 | | CDL-TP24A-01-012 | | | CDL-TP27A-00-004 | | CDL-TP27A-01-004 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | |
| Calcium | mg/kg | 1200 | | 1200 | | 0.0% | 5300 | J | 1700 | J | 102.9% |
| Chromium | mg/kg | 15 | | 13 | | 14.3% | 58 | | 17 | | 109.3% |
| Cobalt | mg/kg | 2.9 | | 2.5 | J | 14.8% | 15 | | 4.1 | | 114.1% |
| Copper | mg/kg | 15 | | 13 | | 14.3% | 180 | J | 56 | J | 105.1% |
| Iron | mg/kg | 8200 | | 7400 | | 10.3% | 160000 | | 20000 | | 155.6% |
| Lead | mg/kg | 31 | | 39 | | 22.9% | 250 | | 190 | | 27.3% |
| **Inorganics Continued** | | | | | | | | | | | |
| Magnesium | mg/kg | 1000 | | 890 | | 11.6% | 1200 | J | 950 | | 23.3% |
| Manganese | mg/kg | 140 | | 150 | | 6.9% | 980 | J | 330 | J | 99.2% |
| Mercury | mg/kg | 0.23 | | 0.095 | | 83.1% | 0.047 | J | 0.045 | J | 4.3% |
| Nickel | mg/kg | 6.7 | | 5.9 | | 12.7% | 35 | | 14 | | 85.7% |
| Potassium | mg/kg | 660 | | 520 | J | 23.7% | 430 | | 390 | | 9.8% |
| Selenium | mg/kg | 1.8 | U | 1.8 | U | NC | 8.8 | U | 0.76 | U | NC |
| Silver | mg/kg | 0.55 | U | 0.55 | U | NC | 15 | | 4.6 | | 106.1% |
| Sodium | mg/kg | 280 | U | 270 | U | NC | 130 | J | 75 | J | 53.7% |
| Thallium | mg/kg | 2.8 | U | 2.7 | U | NC | 1.4 | U | 1.2 | U | NC |
| Vanadium | mg/kg | 18 | | 16 | | 11.8% | 15 | J | 14 | | 6.9% |
| Zinc | mg/kg | 70 | | 58 | | 18.8% | 430 | J | 160 | J | 91.5% |

**Notes:**
NC = not calculated
J = analyte was positively identified, but value is estimated
mg/kg = milligrams per kilogram
NA = not analyzed
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/g = picograms per gram
R = result or limit of detection was rejected
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/kg = micrograms per kilogram

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | DPW14 | | DPW14 | | Relative Percent Difference | DPW16 | | DPW16 | | Relative Percent Difference | DPW3 | | DPW3 | | Relative Percent Difference | DPW4 | | DPW4 | | Relative Percent Difference | DPW8 | | DPW8 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | CDL-DPW14-00-3140 | | CDL-DPW14-01-3140 | | | CDL-DPW16-00-2130 | | CDL-DPW16-01-2130 | | | CDL-DPW03-00-1120 | | CDL-DPW03-01-1120 | | | CDL-DPW04-00-1928 | | CDL-DPW04-01-1928 | | | CDL-DPW08-00-1130 | | CDL-DPW08-01-1130 | | |
| Parent/Duplicate | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,1,2,2-Tetrachloroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,1,2-Trichloroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,1-Dichloroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,1-Dichloroethene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,2,4-Trichlorobenzene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,2-Dibromo-3-Chloropropane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,2-Dibromoethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,2-Dichlorobenzene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,2-Dichloroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,2-Dichloropropane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,3-Dichlorobenzene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 1,4-Dichlorobenzene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 2-Butanone (MEK) | µg/l | 80 | U | 80 | U | NC | 4 | U | 4 | U | NC | 200 | U | 200 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| 2-Hexanone | µg/l | 80 | U | 80 | U | NC | 4 | U | 4 | U | NC | 200 | U | 200 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 80 | U | 80 | U | NC | 4 | U | 4 | U | NC | 200 | U | 200 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Acetone | µg/l | 80 | U | 80 | U | NC | 4 | U | 4 | U | NC | 200 | U | 200 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Benzene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 160 | | 110 | | 37.0% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Bromodichloromethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Bromoform | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Bromomethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| BTEX Total | µg/l | 5630 | | 5400 | | 4.2% | 0.8 | U | 0.8 | U | NC | 6650 | | 6460 | | 2.9% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Carbon Disulfide | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Carbon Tetrachloride | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Chlorobenzene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Chloroethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Chloroform | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Chloromethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| cis-1,2-Dichloroethene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| cis-1,3-Dichloropropene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Cyclohexane | µg/l | 490 | | 360 | | 30.6% | 0.8 | U | 0.8 | U | NC | 290 | | 300 | | 3.4% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Dibromochloromethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Dichlorodifluoromethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Ethylbenzene | µg/l | 630 | | 610 | | 3.2% | 0.8 | U | 0.8 | U | NC | 1300 | | 1300 | | 0.0% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Isopropylbenzene | µg/l | 53 | | 56 | | 5.5% | 0.8 | U | 0.8 | U | NC | 91 | | 86 | | 5.6% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Methyl Acetate | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Methyl Tert-Butyl Ether | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Methylcylohexane | µg/l | 440 | | 330 | | 28.6% | 0.8 | U | 0.8 | U | NC | 110 | J | 100 | J | 9.5% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Methylene Chloride | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Styrene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 9.5 | J | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Tetrachloroethene | µg/l | 14 | J | 14 | J | 0.0% | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Toluene | µg/l | 1100 | | 990 | | 10.5% | 0.8 | U | 0.8 | U | NC | 390 | J | 550 | J | 34.0% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| trans-1,2-Dichloroethene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| trans-1,3-Dichloropropene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Trichloroethene | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Trichlorofluoromethane | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Vinyl Chloride | µg/l | 16 | U | 16 | U | NC | 0.8 | U | 0.8 | U | NC | 40 | U | 40 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Xylenes (Total) | µg/l | 3900 | | 3800 | | 2.6% | 0.8 | U | 0.8 | U | NC | 4800 | | 4500 | | 6.5% | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 3.7 | J | 3.1 | J | 17.6% | 0.4 | U | 0.4 | UJ | NC | 5.5 | | 5.4 | | 1.8% | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 2,4,5-Trichlorophenol | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 2,4,6-Trichlorophenol | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 2,4-Dichlorophenol | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 2,4-Dimethylphenol | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 2,4-Dinitrophenol | µg/l | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | U | 3.2 | UJ | NC | 3.2 | U | 3.2 | U | NC | 3.2 | U | 3.2 | U | NC | 3.2 | U | NA | | NC |
| 2,4-Dinitrotoluene | µg/l | 1 | UJ | 1 | UJ | NC | 1 | U | 1 | UJ | NC | 1 | U | 1 | U | NC | 1 | U | 1 | U | NC | 1 | U | NA | | NC |

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | DPW14 | | DPW14 | | Relative Percent Difference | DPW16 | | DPW16 | | Relative Percent Difference | DPW3 | | DPW3 | | Relative Percent Difference | DPW4 | | DPW4 | | Relative Percent Difference | DPW8 | | DPW8 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | CDL-DPW14-00-3140 | | CDL-DPW14-01-3140 | | | CDL-DPW16-00-2130 | | CDL-DPW16-01-2130 | | | CDL-DPW03-00-1120 | | CDL-DPW03-01-1120 | | | CDL-DPW04-00-1928 | | CDL-DPW04-01-1928 | | | CDL-DPW08-00-1130 | | CDL-DPW08-01-1130 | | |
| Parent/Duplicate | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| 2,6-Dinitrotoluene | µg/l | 1 | UJ | 1 | UJ | NC | 1 | U | 1 | UJ | NC | 1 | U | 1 | U | NC | 1 | U | 1 | U | NC | 1 | U | NA | | NC |
| 2-Chloronaphthalene | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 2-Chlorophenol | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | µg/l | 45 | | 38 | | 16.9% | 0.1 | U | 0.1 | UJ | NC | 68 | | 71 | | 4.3% | 0.1 | U | 0.1 | U | NC | 0.1 | U | NA | | NC |
| 2-Methylphenol | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 2-Nitroaniline | µg/l | 1.6 | UJ | 1.6 | UJ | NC | 1.6 | U | 1.6 | UJ | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | NA | | NC |
| 2-Nitrophenol | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 3,3'-Dichlorobenzidine | µg/l | 2 | UJ | 2 | UJ | NC | 2 | UJ | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 2 | UJ | NA | | NC |
| 3-Nitroaniline | µg/l | 1.6 | UJ | 1.6 | UJ | NC | 1.6 | U | 1.6 | UJ | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | NA | | NC |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | UJ | NA | | NC |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| 4-Chloroaniline | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| 4-Nitroaniline | µg/l | 1.6 | UJ | 1.6 | UJ | NC | 1.6 | U | 1.6 | UJ | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | NA | | NC |
| 4-Nitrophenol | µg/l | 2 | UJ | 2 | UJ | NC | 2 | U | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 2 | U | NA | | NC |
| Acenaphthene | µg/l | 0.34 | J | 0.29 | J | 15.9% | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Acenaphthylene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Acetophenone | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Anthracene | µg/l | 0.073 | J | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Atrazine | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Benzaldehyde | µg/l | 2 | UJ | 2 | UJ | NC | 2 | U | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 2 | U | NA | | NC |
| Benzo(a)Anthracene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Benzo(a)Pyrene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Benzo(b)Fluoranthene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Benzo(g,h,i)Perylene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Benzo(k)Fluoranthene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Benzyl Butyl Phthalate | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | UJ | NA | | NC |
| Bis-Chloroisopropyl ether | µg/l | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Caprolactam | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Carbazole | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Chrysene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| m & p Cresol | µg/l | 0.76 | J | 0.77 | J | 1.3% | 2 | U | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 2 | U | NA | | NC |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Dibenzofuran | µg/l | 0.67 | J | 0.62 | J | 7.8% | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Diethyl Phthalate | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Dimethyl Phthalate | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Di-N-Butylphthalate | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Di-N-Octylphthalate | µg/l | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 4 | U | NA | | NC |
| Fluoranthene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Fluorene | µg/l | 0.59 | J | 0.55 | J | 7.0% | 0.16 | U | 0.16 | UJ | NC | 1.4 | J | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Hexachlorobenzene | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Hexachlorocyclopentadiene | µg/l | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | U | 3.2 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | UJ | NA | | NC |
| Hexachloroethane | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Isophorone | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| Naphthalene | µg/l | 58 | | 51 | | 12.8% | 0.16 | U | 0.16 | UJ | NC | 120 | | 120 | | 0.0% | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Nitrobenzene | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 | UJ | 0.8 | UJ | NC | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC |
| N-Nitrosodiphenylamine | µg/l | 0.92 | UJ | 0.92 | UJ | NC | 0.92 | UJ | 0.92 | UJ | NC | 0.92 | U | 0.92 | U | NC | 0.92 | U | 0.92 | U | NC | 0.92 | U | NA | | NC |
| Pentachlorophenol | µg/l | 1.5 | UJ | 1.5 | UJ | NC | 1.5 | U | 1.5 | UJ | NC | 1.5 | U | 1.5 | U | NC | 1.5 | U | 1.5 | U | NC | 1.5 | U | NA | | NC |
| Phenanthrene | µg/l | 0.51 | J | 0.52 | J | 1.9% | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| Phenol | µg/l | 0.4 | UJ | 0.4 | UJ | NC | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | NA | | NC |

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW14 | | DPW14 | | Relative Percent Difference | DPW16 | | DPW16 | | Relative Percent Difference | DPW3 | | DPW3 | | Relative Percent Difference | DPW4 | | DPW4 | | Relative Percent Difference | DPW8 | | DPW8 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW14-00-3140 | | CDL-DPW14-01-3140 | | | CDL-DPW16-00-2130 | | CDL-DPW16-01-2130 | | | CDL-DPW03-00-1120 | | CDL-DPW03-01-1120 | | | CDL-DPW04-00-1928 | | CDL-DPW04-01-1928 | | | CDL-DPW08-00-1130 | | CDL-DPW08-01-1130 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Pyrene | µg/l | 0.14 | J | 0.14 | J | 0.0% | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | NA | | NC |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,4,6,7,8-HPCDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,4,7,8,9-HPCDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| **Dioxins/Furans Continued** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,7,8-HXCDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,6,7,8-HXCDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,7,8,9-HXCDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 2,3,4,6,7,8-HXCDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 2,3,4,7,8-PECDF | pg/l | NA | | NA | | NC | 35.9 | U | 37.5 | U | NC | NA | | NA | | NC | 34.8 | U | NA | | NC | 36.7 | U | 36.8 | U | NC |
| 2,3,7,8-TCDD | pg/l | NA | | NA | | NC | 7.15 | U | 7.48 | U | NC | NA | | NA | | NC | 6.94 | U | NA | | NC | 7.33 | U | 7.34 | U | NC |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | NA | | NA | | NC | 7.15 | U | 7.48 | U | NC | NA | | NA | | NC | 6.94 | UJ | NA | | NC | 7.33 | UJ | 7.34 | UJ | NC |
| OCDD | pg/l | NA | | NA | | NC | 150 | | 74.8 | U | NC | NA | | NA | | NC | 140 | J | NA | | NC | 206 | | 177 | | 15.1% |
| OCDF | pg/l | NA | | NA | | NC | 71.5 | U | 74.8 | U | NC | NA | | NA | | NC | 69.4 | U | NA | | NC | 73.3 | U | 73.4 | U | NC |
| Total TEQ (WHO 2005) ND = 0 | pg/l | NA | | NA | | NC | 0.0451 | | 0 | U | NC | NA | | NA | | NC | 0.042 | | NA | | NC | 0.0619 | | 0.0531 | | 15.3% |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | NA | | NA | | NC | 20.5 | | 21.3 | | 3.8% | NA | | NA | | NC | 19.9 | | NA | | NC | 21 | | 21 | | 0.0% |
| **Dissolved Inorganics** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 | U | 0.2 | U | NC | 0.2 | U | 0.2 | U | NC | 0.2 | U | 0.2 | U | NC | 0.2 | U | 0.2 | U | NC | 0.2 | U | NA | | NC |
| Antimony | mg/l | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC | 0.015 | U | NA | | NC |
| Arsenic | mg/l | 0.008 | U | 0.0022 | J | NC | 0.008 | U | 0.008 | U | NC | 0.0043 | J | 0.0028 | J | 42.3% | 0.008 | U | 0.008 | U | NC | 0.008 | U | NA | | NC |
| Barium | mg/l | 0.0086 | J | 0.024 | J | 94.5% | 0.0076 | J | 0.008 | J | 5.1% | 0.032 | | 0.034 | | 6.1% | 0.005 | J | 0.005 | J | 0.0% | 0.017 | J | NA | | NC |
| Beryllium | mg/l | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | NA | | NC |
| Cadmium | mg/l | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | NA | | NC |
| Calcium | mg/l | 17 | | 19 | | 11.1% | 20 | | 21 | | 4.9% | 27 | | 30 | | 10.5% | 25 | | 24 | | 4.1% | 35 | | NA | | NC |
| Chromium | mg/l | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.00081 | J | 0.00078 | J | 3.8% | 0.019 | | 0.021 | | 10.0% | 0.005 | U | NA | | NC |
| Cobalt | mg/l | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC | 0.013 | U | NA | | NC |
| Copper | mg/l | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | NA | | NC |
| Iron | mg/l | 6.3 | | 6.4 | | 1.6% | 0.08 | U | 0.08 | U | NC | 37 | | 32 | | 14.5% | 0.08 | U | 0.08 | U | NC | 0.08 | U | NA | | NC |
| Lead | mg/l | 0.0087 | J | 0.0073 | J | 17.5% | 0.009 | U | 0.009 | U | NC | 0.009 | U | 0.009 | U | NC | 0.009 | U | 0.009 | U | NC | 0.009 | U | NA | | NC |
| Magnesium | mg/l | 1.2 | J | 1.3 | J | 8.0% | 5.9 | | 6.4 | | 8.1% | 1.8 | J | 1.9 | J | 5.4% | 1.1 | J | 1.1 | J | 0.0% | 4.7 | J | NA | | NC |
| Manganese | mg/l | 0.029 | | 0.037 | | 24.2% | 0.12 | | 0.13 | | 8.0% | 1.3 | | 1.3 | | 0.0% | 0.014 | J | 0.016 | | 13.3% | 0.13 | | NA | | NC |
| Mercury | mg/l | 0.0001 | U | 0.0001 | U | NC | 0.0001 | U | 0.0001 | U | NC | 0.0001 | U | 0.0001 | U | NC | 0.0001 | U | 0.0001 | U | NC | 3.20E-05 | J | NA | | NC |
| Nickel | mg/l | 0.008 | U | 0.008 | U | NC | 0.008 | U | 0.008 | U | NC | 0.008 | U | 0.008 | U | NC | 0.008 | U | 0.008 | U | NC | 0.008 | U | NA | | NC |
| Potassium | mg/l | 1.2 | J | 1.2 | J | 0.0% | 1.7 | J | 1.8 | J | 5.7% | 2.2 | J | 2.4 | J | 8.7% | 0.42 | J | 0.47 | J | 11.2% | 2.6 | J | NA | | NC |
| Selenium | mg/l | 0.017 | U | 0.017 | U | NC | 0.017 | U | 0.017 | U | NC | 0.017 | U | 0.017 | U | NC | 0.017 | U | 0.017 | U | NC | 0.017 | U | NA | | NC |
| Silver | mg/l | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | NA | | NC |
| Sodium | mg/l | 5.5 | | 5.7 | | 3.6% | 5 | | 5.4 | | 7.7% | 13 | | 13 | | 0.0% | 5.4 | | 5.8 | | 7.1% | 11 | | NA | | NC |
| Thallium | mg/l | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | NA | | NC |
| Vanadium | mg/l | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | NA | | NC |
| Zinc | mg/l | 0.01 | U | 0.01 | U | NC | 0.051 | | 0.053 | | 3.8% | 0.01 | U | 0.01 | U | NC | 0.01 | U | 0.01 | U | NC | 0.01 | U | NA | | NC |
| **Total Inorganics** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Antimony | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Arsenic | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Barium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Beryllium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Cadmium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Calcium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Chromium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Cobalt | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Copper | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Iron | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| Location | | DPW14 | | DPW14 | | Relative Percent Difference | DPW16 | | DPW16 | | Relative Percent Difference | DPW3 | | DPW3 | | Relative Percent Difference | DPW4 | | DPW4 | | Relative Percent Difference | DPW8 | | DPW8 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample # | | CDL-DPW14-00-3140 | | CDL-DPW14-01-3140 | | | CDL-DPW16-00-2130 | | CDL-DPW16-01-2130 | | | CDL-DPW03-00-1120 | | CDL-DPW03-01-1120 | | | CDL-DPW04-00-1928 | | CDL-DPW04-01-1928 | | | CDL-DPW08-00-1130 | | CDL-DPW08-01-1130 | | |
| Parent/Duplicate | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Lead | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Magnesium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Manganese | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Mercury | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Nickel | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Potassium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Selenium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Silver | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Sodium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| **Total Inorganics Continued** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Thallium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Vanadium | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Zinc | mg/l | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |

**Notes:**
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
NA = not analyzed
NC = not calculated
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | DTW1 | | DTW1 | | Relative Percent Difference | MW-3 | | MW-3 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-DTW1-00-119128 | | CDL-DTW1-01-119128 | | | CDL-MW3-00-007026-02 | | CDL-MW3-01-007026-02 | | | CDL-MW4-00-009028 | | CDL-MW4-01-009028 | | | CDL-MW4-00-009028-02 | | CDL-MW4-01-009028-02 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,1,2,2-Tetrachloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,1,2-Trichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,1,2-Trichlorotrifluoroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,1-Dichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,1-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,2,4-Trichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,2-Dibromo-3-Chloropropane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,2-Dibromoethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,2-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,2-Dichloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,2-Dichloropropane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,3-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 1,4-Dichlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| 2-Butanone (MEK) | µg/l | 4 | U | 4 | U | NC | 4 | U | NA | | NC | 40 | U | 40 | U | NC | 200 | U | 200 | U | NC |
| 2-Hexanone | µg/l | 4 | U | 4 | U | NC | 4 | U | NA | | NC | 40 | U | 40 | U | NC | 200 | U | 200 | U | NC |
| 4-Methyl-2-Pentanone (MIBK) | µg/l | 4 | U | 4 | U | NC | 4 | U | NA | | NC | 3.6 | J | 40 | U | NC | 200 | U | 200 | U | NC |
| Acetone | µg/l | 4 | U | 4 | U | NC | 4 | U | NA | | NC | 40 | U | 40 | U | NC | 200 | U | 200 | U | NC |
| Benzene | µg/l | 0.89 | J | 0.77 | J | 14.5% | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Bromodichloromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Bromoform | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Bromomethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| BTEX Total | µg/l | 24.39 | | 25.37 | | 3.9% | 0.8 | U | NA | | NC | 3600 | | 3700 | | 2.7% | 4520 | | 4670 | | 3.3% |
| Carbon Disulfide | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Carbon Tetrachloride | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Chlorobenzene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Chloroethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 4.4 | J | NC | 40 | U | 40 | U | NC |
| Chloroform | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Chloromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| cis-1,2-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 22 | | 21 | | 4.7% | 22 | J | 40 | U | NC |
| cis-1,3-Dichloropropene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Cyclohexane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 180 | | 190 | | 5.4% | 330 | | 330 | | 0.0% |
| Dibromochloromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Dichlorodifluoromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Ethylbenzene | µg/l | 2.9 | | 3.1 | | 6.7% | 0.8 | U | NA | | NC | 430 | | 450 | | 4.5% | 580 | | 600 | | 3.4% |
| Isopropylbenzene | µg/l | 0.47 | J | 0.5 | J | 6.2% | 0.8 | U | NA | | NC | 56 | J | 60 | J | 6.9% | 80 | | 83 | | 3.7% |
| Methyl Acetate | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Methyl Tert-Butyl Ether | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Methylcylohexane | µg/l | 12 | | 13 | | 8.0% | 0.8 | U | NA | | NC | 99 | | 110 | | 10.5% | 200 | J | 210 | J | 4.9% |
| Methylene Chloride | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Styrene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Tetrachloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 3.8 | J | 3.6 | J | 5.4% | 40 | U | 40 | U | NC |
| Toluene | µg/l | 6.6 | | 6.5 | | 1.5% | 0.8 | U | NA | | NC | 670 | J | 650 | J | 3.0% | 540 | | 570 | | 5.4% |
| trans-1,2-Dichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| trans-1,3-Dichloropropene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Trichloroethene | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Trichlorofluoromethane | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Vinyl Chloride | µg/l | 0.8 | U | 0.8 | U | NC | 0.8 | U | NA | | NC | 8 | U | 8 | U | NC | 40 | U | 40 | U | NC |
| Xylenes (Total) | µg/l | 14 | | 15 | | 6.9% | 0.8 | U | NA | | NC | 2500 | | 2600 | | 3.9% | 3400 | | 3500 | | 2.9% |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 2.8 | | 2.8 | | 0.0% | 3.3 | J | 3.2 | J | 3.1% |
| 2,4,5-Trichlorophenol | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 2,4,6-Trichlorophenol | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 2,4-Dichlorophenol | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 2,4-Dimethylphenol | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 1.9 | J | NC |
| 2,4-Dinitrophenol | µg/l | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | U | 3.2 | U | NC | 3.2 | U | 3.2 | U | NC | 32 | U | 32 | U | NC |
| 2,4-Dinitrotoluene | µg/l | 1 | U | 1 | UJ | NC | 1 | U | 1 | U | NC | 1 | U | 1 | U | NC | 10 | U | 10 | U | NC |

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | DTW1 | | DTW1 | | Relative Percent Difference | MW-3 | | MW-3 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-DTW1-00-119128 | | CDL-DTW1-01-119128 | | | CDL-MW3-00-007026-02 | | CDL-MW3-01-007026-02 | | | CDL-MW4-00-009028 | | CDL-MW4-01-009028 | | | CDL-MW4-00-009028-02 | | CDL-MW4-01-009028-02 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| 2,6-Dinitrotoluene | µg/l | 1 | U | 1 | UJ | NC | 1 | U | 1 | U | NC | 1 | U | 1 | U | NC | 10 | U | 10 | U | NC |
| 2-Chloronaphthalene | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 2-Chlorophenol | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| **Semi-Volatile Organic Compounds Continued** | | | | | | | | | | | | | | | | | | | | | |
| 2-Methylnaphthalene | µg/l | 1.6 | | 1.5 | J | 6.5% | 0.1 | U | 0.1 | U | NC | 39 | | 48 | | 20.7% | 59 | | 57 | | 3.4% |
| 2-Methylphenol | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 2-Nitroaniline | µg/l | 1.6 | U | 1.6 | UJ | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | 1.6 | U | NC | 16 | U | 16 | U | NC |
| 2-Nitrophenol | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| 3,3'-Dichlorobenzidine | µg/l | 2 | U | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 20 | U | 20 | U | NC |
| 3-Nitroaniline | µg/l | 1.6 | U | 1.6 | UJ | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | 1.6 | U | NC | 16 | U | 16 | U | NC |
| 4,6-Dinitro-2-Methylphenol | µg/l | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 40 | U | 40 | U | NC |
| 4-Bromophenyl Phenyl Ether | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 4-Chloro-3-Methylphenol | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| 4-Chloroaniline | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 4-Chlorophenyl Phenyl Ether | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| 4-Nitroaniline | µg/l | 1.6 | U | 1.6 | UJ | NC | 1.6 | U | 1.6 | U | NC | 1.6 | U | 1.6 | U | NC | 16 | U | 16 | U | NC |
| 4-Nitrophenol | µg/l | 2 | U | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 20 | U | 20 | U | NC |
| Acenaphthene | µg/l | 0.21 | | 0.19 | J | 10.0% | 0.16 | U | 0.16 | U | NC | 0.32 | | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Acenaphthylene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Acetophenone | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| Anthracene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Atrazine | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Benzaldehyde | µg/l | 2 | U | 2 | UJ | NC | 2 | U | 2 | U | NC | 2 | U | 2 | U | NC | 20 | U | 20 | U | NC |
| Benzo(a)Anthracene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Benzo(a)Pyrene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | UJ | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 1.6 | UJ | 1.6 | UJ | NC |
| Benzo(b)Fluoranthene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Benzo(g,h,i)Perylene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Benzo(k)Fluoranthene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Benzyl Butyl Phthalate | µg/l | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 40 | U | 40 | U | NC |
| Bis(2-Chloroethoxy)Methane | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Bis(2-Chloroethyl) Ether | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Bis(2-Ethylhexyl)Phthalate | µg/l | 1 | J | 0.44 | J | 77.8% | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | U | NC | 40 | UJ | 40 | UJ | NC |
| Bis-Chloroisopropyl ether | µg/l | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Caprolactam | µg/l | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 40 | U | 40 | U | NC |
| Carbazole | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| Chrysene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| m & p Cresol | µg/l | 0.51 | J | 2 | UJ | NC | 2 | U | 2 | U | NC | 3.3 | | 2.3 | | 35.7% | 20 | U | 20 | U | NC |
| Dibenzo(a,h)Anthracene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Dibenzofuran | µg/l | 0.19 | J | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Diethyl Phthalate | µg/l | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 40 | U | 40 | U | NC |
| Dimethyl Phthalate | µg/l | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 40 | U | 40 | U | NC |
| Di-N-Butylphthalate | µg/l | 4 | U | 4 | UJ | NC | 4 | U | 4 | U | NC | 4 | U | 4 | U | NC | 40 | U | 40 | U | NC |
| Di-N-Octylphthalate | µg/l | 4 | U | 4 | UJ | NC | 4 | UJ | 4 | UJ | NC | 4 | U | 4 | U | NC | 40 | UJ | 40 | UJ | NC |
| Fluoranthene | µg/l | 0.1 | J | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Fluorene | µg/l | 0.16 | U | 0.23 | J | NC | 0.16 | U | 0.16 | U | NC | 0.44 | | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Hexachloro-1,3-Butadiene | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Hexachlorobenzene | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| Hexachlorocyclopentadiene | µg/l | 3.2 | U | 3.2 | UJ | NC | 3.2 | UJ | 3.2 | UJ | NC | 3.2 | U | 3.2 | U | NC | 32 | UJ | 32 | UJ | NC |
| Hexachloroethane | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| Indeno(1,2,3-cd)Pyrene | µg/l | 0.16 | U | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Isophorone | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| Naphthalene | µg/l | 1.7 | | 1.7 | J | 0.0% | 0.16 | U | 0.16 | U | NC | 72 | | 82 | | 13.0% | 110 | | 110 | | 0.0% |
| Nitrobenzene | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |
| N-Nitroso-Di-N-Propylamine | µg/l | 0.8 | U | 0.8 | UJ | NC | 0.8 | U | 0.8 | U | NC | 0.8 | U | 0.8 | U | NC | 8 | U | 8 | U | NC |
| N-Nitrosodiphenylamine | µg/l | 0.92 | U | 0.92 | UJ | NC | 0.92 | U | 0.92 | U | NC | 0.92 | U | 0.92 | U | NC | 9.2 | U | 9.2 | U | NC |
| Pentachlorophenol | µg/l | 1.5 | U | 1.5 | UJ | NC | 1.5 | U | 1.5 | U | NC | 1.5 | U | 1.5 | U | NC | 15 | U | 15 | U | NC |
| Phenanthrene | µg/l | 0.57 | | 0.47 | J | 19.2% | 0.16 | U | 0.16 | U | NC | 0.15 | J | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| Phenol | µg/l | 0.4 | U | 0.4 | UJ | NC | 0.4 | U | 0.4 | U | NC | 0.4 | U | 0.4 | U | NC | 4 | U | 4 | U | NC |

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | DTW1 | | DTW1 | | Relative Percent Difference | MW-3 | | MW-3 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-DTW1-00-119128 | | CDL-DTW1-01-119128 | | | CDL-MW3-00-007026-02 | | CDL-MW3-01-007026-02 | | | CDL-MW4-00-009028 | | CDL-MW4-01-009028 | | | CDL-MW4-00-009028-02 | | CDL-MW4-01-009028-02 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Pyrene | µg/l | 0.093 | J | 0.16 | UJ | NC | 0.16 | U | 0.16 | U | NC | 0.16 | U | 0.16 | U | NC | 1.6 | U | 1.6 | U | NC |
| **Dioxins/Furans** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,4,6,7,8-HPCDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,4,7,8,9-HPCDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| **Dioxins/Furans Continued** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,7,8-HXCDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-Dioxin | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,6,7,8-HXCDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-Dioxin | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,7,8,9-HXCDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzofuran | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 1,2,3,7,8-Pentachlorodibenzo-p-Dioxin | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 2,3,4,6,7,8-HXCDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 2,3,4,7,8-PECDF | pg/l | 34.7 | U | 35.2 | U | NC | 34.7 | U | NA | | NC | 36 | U | 35.2 | U | NC | 36.5 | U | 36.2 | U | NC |
| 2,3,7,8-TCDD | pg/l | 6.91 | U | 7.01 | U | NC | 6.92 | UJ | NA | | NC | 7.18 | U | 7.02 | U | NC | 7.27 | UJ | 7.23 | UJ | NC |
| 2,3,7,8-Tetrachlorodibenzofuran | pg/l | 6.91 | U | 7.01 | U | NC | 6.92 | UJ | NA | | NC | 7.18 | UJ | 7.02 | UJ | NC | 7.27 | UJ | 7.23 | UJ | NC |
| OCDD | pg/l | 95.2 | J | 441 | | 129.0% | 458 | | NA | | NC | 136 | | 118 | | 14.2% | 166 | | 123 | | 29.8% |
| OCDF | pg/l | 69.1 | U | 70.1 | U | NC | 69.2 | U | NA | | NC | 71.8 | U | 70.2 | U | NC | 72.7 | U | 72.3 | U | NC |
| Total TEQ (WHO 2005) ND = 0 | pg/l | 0.0286 | | 0.132 | | 128.8% | 0.137 | | NA | | NC | 0.0407 | | 0.0353 | | 14.2% | 0.0498 | | 0.037 | | 29.5% |
| Total TEQ (WHO 2005) ND = 0.5 | pg/l | 19.8 | | 20.1 | | 1.5% | 19.9 | | NA | | NC | 20.5 | | 20.1 | | 2.0% | 20.4 | | 20.7 | | 1.5% |
| **Dissolved Inorganics** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | mg/l | 0.2 | U | 0.2 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Antimony | mg/l | 0.015 | U | 0.015 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Arsenic | mg/l | 0.008 | U | 0.008 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Barium | mg/l | 0.041 | | 0.036 | | 13.0% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Beryllium | mg/l | 0.0025 | U | 0.0025 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Cadmium | mg/l | 0.0025 | U | 0.0025 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Calcium | mg/l | 18 | | 16 | | 11.8% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Chromium | mg/l | 0.005 | U | 0.005 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Cobalt | mg/l | 0.011 | J | 0.0096 | J | 13.6% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Copper | mg/l | 0.005 | U | 0.005 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Iron | mg/l | 9.8 | | 8.6 | | 13.0% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Lead | mg/l | 0.009 | U | 0.009 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Magnesium | mg/l | 5.4 | | 4.8 | J | 11.8% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Manganese | mg/l | 0.35 | | 0.3 | | 15.4% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Mercury | mg/l | 0.0001 | U | 0.0001 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Nickel | mg/l | 0.021 | J | 0.018 | J | 15.4% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Potassium | mg/l | 2 | J | 1.7 | J | 16.2% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Selenium | mg/l | 0.017 | U | 0.017 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Silver | mg/l | 0.005 | U | 0.005 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Sodium | mg/l | 12 | | 11 | | 8.7% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Thallium | mg/l | 0.025 | U | 0.025 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Vanadium | mg/l | 0.025 | U | 0.025 | U | NC | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| Zinc | mg/l | 0.035 | | 0.032 | | 9.0% | NA | | NA | | NC | NA | | NA | | NC | NA | | NA | | NC |
| **Total Inorganics** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | mg/l | NA | | NA | | NC | 7.3 | | 8.2 | | 11.6% | 0.2 | U | 0.2 | U | NC | 0.2 | U | 0.2 | U | NC |
| Antimony | mg/l | NA | | NA | | NC | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC | 0.015 | U | 0.015 | U | NC |
| Arsenic | mg/l | NA | | NA | | NC | 0.008 | U | 0.008 | U | NC | 0.0044 | J | 0.0057 | J | 25.7% | 0.0058 | J | 0.0038 | J | 41.7% |
| Barium | mg/l | NA | | NA | | NC | 0.02 | J | 0.023 | J | 14.0% | 0.025 | | 0.023 | J | 8.3% | 0.013 | J | 0.013 | J | 0.0% |
| Beryllium | mg/l | NA | | NA | | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC | 0.0025 | U | 0.0025 | U | NC |
| Cadmium | mg/l | NA | | NA | | NC | 0.0025 | U | 0.0007 | J | NC | 0.0025 | U | 0.0025 | U | NC | 0.0006 | J | 0.0025 | U | NC |
| Calcium | mg/l | NA | | NA | | NC | 21 | | 21 | | 0.0% | 31 | | 29 | | 6.7% | 19 | | 19 | | 0.0% |
| Chromium | mg/l | NA | | NA | | NC | 0.005 | U | 0.0094 | J | NC | 0.0017 | J | 0.0026 | J | 41.9% | 0.005 | U | 0.005 | U | NC |
| Cobalt | mg/l | NA | | NA | | NC | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC | 0.013 | U | 0.013 | U | NC |
| Copper | mg/l | NA | | NA | | NC | 0.045 | | 0.051 | | 12.5% | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC |
| Iron | mg/l | NA | | NA | | NC | 3.7 | | 4.3 | | 15.0% | 15 | | 15 | | 0.0% | 13 | | 12 | | 8.0% |

**Table E-5**
**Relative Percent Difference Calculations Groundwater Duplicate Samples**
**Supplemental Field Investigation**
**Project 15 CDL, Wallops Island, Virginia**

| | | DTW1 | | DTW1 | | Relative Percent Difference | MW-3 | | MW-3 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference | MW-4 | | MW-4 | | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | CDL-DTW1-00-119128 | | CDL-DTW1-01-119128 | | | CDL-MW3-00-007026-02 | | CDL-MW3-01-007026-02 | | | CDL-MW4-00-009028 | | CDL-MW4-01-009028 | | | CDL-MW4-00-009028-02 | | CDL-MW4-01-009028-02 | | |
| | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | | Parent | | Duplicate | | |
| Analyte | Units | Result | | Result | | | Result | | Result | | | Result | | Result | | | Result | | Result | | |
| Lead | mg/l | NA | | NA | | NC | 0.009 | U | 0.005 | J | NC | 0.0056 | J | 0.0058 | J | 3.5% | 0.0054 | J | 0.0052 | J | 3.8% |
| Magnesium | mg/l | NA | | NA | | NC | 2.5 | J | 2.5 | J | 0.0% | 1.6 | J | 1.7 | J | 6.1% | 1.5 | J | 1.5 | J | 0.0% |
| Manganese | mg/l | NA | | NA | | NC | 0.018 | | 0.021 | | 15.4% | 0.22 | | 0.22 | | 0.0% | 0.19 | | 0.18 | | 5.4% |
| Mercury | mg/l | NA | | NA | | NC | 0.0001 | U | 3.90E-05 | J | NC | 0.0001 | U | 0.0001 | U | NC | 0.0001 | U | 0.0001 | U | NC |
| Nickel | mg/l | NA | | NA | | NC | 0.008 | U | 0.008 | U | NC | 0.008 | U | 0.008 | U | NC | 0.008 | U | 0.008 | U | NC |
| Potassium | mg/l | NA | | NA | | NC | 1.5 | J | 1.5 | J | 0.0% | 1.5 | J | 1.4 | J | 6.9% | 1.2 | J | 1.1 | J | 8.7% |
| Selenium | mg/l | NA | | NA | | NC | 0.017 | U | 0.017 | U | NC | 0.017 | U | 0.017 | U | NC | 0.017 | U | 0.017 | U | NC |
| Silver | mg/l | NA | | NA | | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC | 0.005 | U | 0.005 | U | NC |
| Sodium | mg/l | NA | | NA | | NC | 5.2 | | 5.3 | | 1.9% | 30 | | 30 | | 0.0% | 26 | | 26 | | 0.0% |
| **Total Inorganics Continued** | | | | | | | | | | | | | | | | | | | | | |
| Thallium | mg/l | NA | | NA | | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC |
| Vanadium | mg/l | NA | | NA | | NC | 0.0073 | J | 0.0077 | J | 5.3% | 0.025 | U | 0.025 | U | NC | 0.025 | U | 0.025 | U | NC |
| Zinc | mg/l | NA | | NA | | NC | 0.01 | J | 0.012 | J | 18.2% | 0.0023 | J | 0.01 | U | NC | 0.01 | U | 0.01 | U | NC |

**Notes:**
J = analyte was positively identified, but value is estimated
mg/l = milligrams per liter
NA = not analyzed
NC = not calculated
ND = non-detect
PAHs = polycyclic aromatic hydrocarbons
pg/l = picograms per liter
TEQ = toxic equivalency
U = analyte not detected above the limit of detection
UJ = analyte not detected above the limit of detection; however, the limit of detection is estimated
WHO = World Health Organization
µg/l = micrograms per liter

# Appendix F

## Human Health Risk Assessment Addendum

National Aeronautics and Space Administration

**FINAL**

# HUMAN HEALTH RISK ASSESSMENT
# REVISION 2
# PROJECT 15 CONSTRUCTION DEBRIS LANDFILL
# WALLOPS FLIGHT FACILITY FORMERLY USED DEFENSE SITE
# WALLOPS ISLAND, VIRGINIA

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

**June 2022**

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**Final**

# Human Health Risk Assessment
# Revision 2
# Project 15 Construction Debris Landfill
# Wallops Flight Facility Formerly Used Defense Site
# Wallops Island, Virginia

**National Aeronautics and Space Administration**
**Goddard Space Flight Facility**
**Wallops Flight Facility**
**Wallops Island, Virginia**

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## Acronyms and Abbreviations

| | |
|---|---|
| 2,3,7,8-TCDD | 2,3,7,8- tetrachlorodibenzo-p-dioxin |
| ABS | absorption fraction |
| ADAF | age dependent adjustment factors |
| AECOM | AECOM Technical Services, Inc. |
| AF | adherence factor |
| AOC | area of concern |
| ASTM | American Society for Testing and Materials |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BAF | bioaccumulation factors |
| BCF | bioconcentration factors |
| bgs | below ground surface |
| BSAF | biota sediment accumulation factors |
| BTV | Background Threshold Value |
| CAF | carcinogenic adjustment factors |
| Cal EPA | California Environmental Protection Agency |
| CENAB | USACE-Baltimore District |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CDC | Center for Disease Control and Prevention |
| CDI | chronic daily intake |
| CDL | Construction Debris Landfill |
| $cm^2$ | centimeters squared |
| COC | Chemical of Concern |

## Acronyms and Abbreviations (continued)

| | |
|---|---|
| CSEM | conceptual site exposure model |
| CSF | cancer slope factor |
| CTE | central tendency exposure |
| DAevent | final absorbed dose |
| DAD | dermally absorbed dose |
| day/year | days per year |
| DOE | Department of Energy |
| DNA | deoxyribonucleic acid |
| DPT | direct push technology |
| DSA | data sensitivity analysis |
| EC | exposure concentration |
| EPA | Environmental Protection Agency |
| EPC | exposure point concentrations |
| FUDS | Formerly Used Defense Site |
| g/day | gallons per day |
| GIABS | gastrointestinal absorption factors |
| HEAST | Health Effects Assessment Summary Tables |
| HHBP | Human Health Benchmarks for Pesticides |
| HHRA | Human Health Risk Assessment |
| HQ | Hazard Quotient |
| IEUBK | Integrated Exposure Uptake Biokinetic |
| IRIS | Integrated Risk Information System |
| IUR | inhalation unit risk |
| Kp | permeability coefficient |
| L/day | Liters per day |
| MAF | mutagenic adjustment factors |
| MDL | method detection limit |
| µg/dL | micrograms per deciliter |
| µg/L | micrograms per liter |
| $(\mu g/m)^{-1}$ | 1/micrograms per cubic meter |
| $mg/cm^2$-event | milligrams per centimeter squared per even |
| mg/day | milligrams per day |
| mg/kg | milligrams per kilogram |
| $(mg/kg\text{-}day)^{-1}$ | 1/milligrams per kilogram-day |
| NASA | National Aeronautics and Space Administration |
| ND | non-detect |
| ODEQ | Oregon Department of Environmental Quality |
| OPP | Office of Pesticide Programs |

## Acronyms and Abbreviations (continued)

| | |
|---|---|
| PEF | particulate emission factor |
| PPRTV | Provisional Peer Reviewed Toxicity Values |
| RAGS | Risk Assessment Guidance for Superfund |
| RFD | reference dose |
| RFC | reference concentration |
| RI | Remedial Investigation |
| RL | risk level |
| RME | reasonable maximum exposure |
| RSL | regional screening levels |
| SA | surface area |
| SL | screening level |
| SVOC | semivolatile organic compound |
| t-event | event duration |
| TAL | Target Analyte List |
| TCL | Target Compound List |
| TEF | toxicity equivalence factors |
| TEQ | toxicity equivalence |
| THQ | target hazard quotient |
| TR | target risk |
| VA | Virginia |
| VDEP | Virginia Department of Environmental Protection |
| VDEQ | Virginia Department of Environmental Quality |
| VF | volatilization factor |
| $VF_{gw,amb}$ | volatilization factor, groundwater-ambient air |
| VI | vapor intrusion |
| VISL | Vapor Intrusion Screening Level |
| VOC | Volatile Organic Compound |
| VRP | Voluntary Remediation Program |
| WFF | Wallops Flight Facility |
| U.S. | United States |
| UCL | upper confidence limit |
| USACE | United States Army Corps of Engineers |

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# 0. Executive Summary

AECOM Technical Services, Inc. (AECOM), on behalf of the National Aeronautics and Space Administration (NASA), updated the supplemental field investigation (SFI) report and human health risk assessment (HHRA) for the Restoration Program, Operable Unit 7, Project 15 Construction Debris Landfill (CDL) at the NASA Goddard Space Flight Center's Wallops Flight Facility (WFF) Formerly Used Defense Site (FUDS), Wallops Island, Virginia (the Site). WFF qualifies as a U.S. Army Corps of Engineers (USACE) FUDS property pursuant to the Environmental Restoration Defense Account and the Defense Environmental Restoration Program, Chapter 160 of the Superfund Amendments and Reauthorization Act of 1986. As part of the USACE FUDS program, USACE-Baltimore District (CENAB) is responsible for oversight of USACE FUDS activities at the former WFF-FUDS. This work is being performed under contract number 80KSC019D0010, delivery order 80GSFC20F0047 with NASA, under the ongoing authorized Environmental Contract.

This Revised HHRA presents a site-specific, quantitative analysis of the Site under current and future land use scenarios based on the nature of the chemicals of potential concern (COPC) detected in environmental media, potential exposure pathways to human receptors, and the degree to which these exposures may pose adverse health effects. The Revised HHRA uses all historical data (collected in 2007 for the Remedial Investigation [RI]) and recently collected Site data (collected in between May 2015 and November 2017 for the SFI), which includes soil, sediment, surface water, and groundwater data. Results of the Revised HHRA will be used to assess potential risk to site receptors.

A quantitative HHRA was completed at the Site to evaluate risks to human health potentially posed by COPCs in the affected media beneath and within the vicinity of the Site that cannot be eliminated using screening criteria. The Revised HHRA is compliant with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, as amended by the Superfund Amendments and Reauthorization Act of 1986, and the Virginia Department of Environmental Quality (VDEQ) risk assessment guidance. The HHRA also follows the U.S. Environmental Protection Agency (EPA) "Risk Assessment Guidance for Superfund (RAGS)" Part A (1989) and subsequent RAGS guidance, which stipulates that a risk assessment addresses the following major steps:

- Data Evaluation: A description of the data handling of each exposure medium and the exposure areas evaluated in the HHRA.
- Identification of COPCs: An identification of the COPCs for each exposure medium regarding human health effects.
- Exposure Assessment: An identification of the human receptors and the potential extent of their exposure to site-related COPCs in affected media.
- Toxicity Assessment: A description of the relationship between the magnitude of exposure (intake, dermally absorbed dose [DAD], or exposure concentration [EC]) and the incidence of adverse health effects associated with the identified COPCs.
- Risk Characterization: A description of the nature and magnitude of potential human health risks, comparison to state and federal target risk levels, and discussion of the uncertainties associated with the risk evaluation.

The Revised HHRA addressed the following exposure media: surface soil (0 to 2 feet below ground surface [bgs]), subsurface soil (2 feet bgs and greater), groundwater (from wells located downgradient of the CDL Site and from upgradient potable well TOC well 06), sediment, and surface water from the adjacent Little Mosquito Creek. Future excavation activities could result in the subsurface soil being brought to the surface and "mixed" together. Therefore, a total soil data set (surface and subsurface data combined) was derived for the surface soil and/or subsurface soil COPCs, assuming future land re-development occurs. Based on the historical aerial photographic analysis (U.S. Army Topographic Engineering Center 2000), four areas of concern (AOCs) within the CDL Site were defined and named with respect to their geographic position to each other: Northern, Central, Southern, and Western AOCs**.** For the Revised HHRA, soil media was divided into two different exposure areas: Central/Southern (C/S) and Northern/Western (N/W). The Western and Northern AOCs were evaluated together because site investigations did not indicate the presence of buried waste. The Central and Southern AOCs were evaluated together because the buried waste was present as observed during site investigations.

The following potential current and future land use scenarios and exposure pathways were addressed in the Revised HHRA:

Current/future outdoor maintenance worker: direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), inhalation of vapors migrating from groundwater to outdoor air, and incidental ingestion and dermal contact with sediment in the upgradient drainage area.

Current/future teen trespasser: direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), incidental ingestion and dermal contact with surface water, and incidental ingestion and dermal contact with sediment. Even though the teen trespasser may go fishing or crabbing, the consumption of fish or crab tissue is likely to be infrequent and is not evaluated in this revised HHRA. The consumption of fish and crab tissue exposure pathway is evaluated under the outdoor recreator (child/adult) scenario and is considered protective of the teen trespasser.

Current/future outdoor recreator (child/adult): direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), incidental ingestion and dermal contact with surface water, ingestion of fish in surface water, incidental ingestion and dermal contact with sediment, and ingestion of Blue Crab in sediment.

Future indoor/outdoor commercial worker: direct contact with the total soil media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors), and inhalation of vapors migrating from groundwater to outdoor air, and vapor intrusion (VI) to indoor air.

Future construction worker: direct contact with the total soil media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors) and direct contact with the groundwater media (i.e., incidental ingestion, dermal contact and inhalation of vapors in a trench).

Future hypothetical resident (child/adult): for the soil exposure areas, the following exposure pathways are evaluated - direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-

blown dust and vapors), and inhalation of vapors migrating from groundwater to outdoor air. For the site-wide exposure area, the following surficial groundwater aquifer exposure pathways are evaluated - direct contact with the groundwater media (i.e., incidental ingestion, dermal contact and inhalation of vapors while showering or bathing), inhalation of vapors migrating from groundwater to outdoor air, and VI to indoor air.

Off-site current/future resident (child/adult): direct contact with the groundwater media from the Yorktown Aquifer (i.e., incidental ingestion, dermal contact and inhalation of vapors while showering or bathing). The VI exposure pathway is not evaluated for the Yorktown Aquifer due to its deep depth (roughly 154 feet bgs).

Various state and federal regulatory agencies mandate target or “acceptable” carcinogenic risk and noncarcinogenic hazard levels. The VDEQ regulations establish a target cumulative risk level (i.e., from all pathways for a single receptor group) of $1\times10^{-4}$ (1E-04) for potential excess lifetime cancer risk (ELCR). The EPA identifies the acceptable cancer risk range to be $1\times10^{-4}$ to $1\times10^{-6}$ (1E-04 to 1E-06). In effect, estimated ELCR that are less than $1\times10^{-6}$ (1E-06) are generally considered negligible. Potential ELCR in the intermediate range between $1\times10^{-4}$ to $1\times10^{-6}$ (1E-04 to 1E-06) can be considered acceptable on a case-by-case basis. The cancer risk of $1\times10^{-6}$ is used as the risk goal for individual carcinogens, with a not-to-exceed ELCR of $1\times10^{-4}$ for all carcinogens. Both the VDEQ and EPA accept a cumulative noncarcinogenic hazard target level, or Hazard Index (HI), of 1. When an HI is above 1 for a receptor, the chemical non-hazard hazard quotients (HQs) are segregated based on the target organ endpoint, and separate target organ-specific HIs are calculated. Only chemicals that act upon the same target organ are expected to be additive.

For each exposure scenario (i.e., receptor and exposure area) with a potential ELCR/HI above the EPA target levels, chemicals of concern (COCs) were identified as COPCs that contributed to the cumulative ELCR to exceed 1E-04 and/or the target organ endpoint HI to exceed 1, at one significant figure.

The Revised HHRA evaluated reasonable maximum exposure (RME) and central tendency exposure (CTE) for each receptor. The RME scenario is intended to assess the highest exposure that is reasonably expected to occur at a site. The CTE scenario refers to individuals who have average or typical intake of exposure media.

**Tables ES-1 and ES-2** summarize the RME and CTE cancer and non-cancer hazard results, respectively. **Table ES-3** presents the carcinogenic COCs that are contributing to unacceptable ELCR results for each receptor and exposure area. **Table ES-4** presents the noncarcinogenic COCs that are contributing to unacceptable target organ-specific HI results for each receptor and exposure area. The RME and CTE results for the Upgradient Drainage, and Downgradient/Estuarine exposure areas are below the EPA cumulative ELCR and HI target levels and are eliminated from further evaluation in the Revised HHRA. The carcinogenic and/or noncarcinogenic results for some receptors at the Central/Southern and Northern/Western exposure areas either equaled or were above EPA target cumulative levels and are discussed further below.

**Central/Southern Exposure Area Cancer Risk Results:**

As shown in **Table ES-3**, the Central/Southern exposure area RME carcinogenic COCs for the current and future lifetime outdoor recreator, future indoor/outdoor commercial worker, and

future hypothetical resident scenarios are primarily metals (arsenic and chromium); PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene); dioxins and furans (i.e., 2,3,7,8-TCDD TEQ); and VOCs (1,1,2-trichloroethane, 1,2-dichloroethane, benzene, chloroform, ethylbenzene, and trichloroethene) in groundwater and surface and total soil. These results assume that groundwater is used for potable purposes even though the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

The Central/Southern exposure area RME and CTE evaluation indicates that the cumulative ELCR results drop from 6E-04 to 1E-04, respectively, for the current lifetime outdoor recreator scenario (**Tables ES-1 and ES-2**). As shown in **Table ES-3**, the RME evaluation identified metals (arsenic and chromium), PAHs (benzo(a)pyrene and dibenz(a,h)anthracene), and dioxins and furans (2,3,7,8-TCDD TEQ) as soil COCs. However, only chromium in surface soil remains as a COC in the CTE evaluation.

The future lifetime outdoor recreator scenario cumulative RME ELCR results are 3E-04 with the addition of VOC 1,1,2-trichloroethane and PAHs (benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene) as soil COCs, but the ELCR drops below the EPA cumulative target ELCR of 1E-04 in the CTE evaluation.

For the future indoor/outdoor commercial worker scenario, the RME evaluation identified metals (arsenic and chromium); PAHs (benzo(a)pyrene and naphthalene); and VOC 1,1,2-trichloroethane as soil COCs. For groundwater, VOCs (1,2-dichloroethane, benzene, and ethylbenzene) were identified as VI COCs. The cumulative RME ELCR results drop from 4E-04 to below the EPA cumulative target ELCR of 1E-04 with 6E-05 in the CTE evaluation (i.e., no soil or groundwater COCs).

For the future lifetime resident scenario, the RME evaluation identified metals (arsenic and chromium); PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (benzene,1,2-dichloroethane, ethylbenzene, 1,1,2-trichloroethane, and trichloroethene) as soil and/or groundwater COCs. The cumulative RME ELCR results drop from 3E-03 to CTE ELCR of 2E-03; the VOCs 1,1,2-trichloroethane and trichloroethene, and PAH dibenz(a,h)anthracene are no longer identified as carcinogenic COCs for soil in the CTE evaluation.

**Central/Southern Exposure Area Non-Cancer Hazard Results:**

As shown in **Table ES-4**, the Central/Southern exposure area RME noncarcinogenic COCs for the future outdoor worker, child outdoor recreator, indoor/outdoor commercial worker, and child and adult resident are primarily metals (aluminum, antimony, arsenic, beryllium, copper, cobalt, iron, manganese, mercury, nickel, thallium, and vanadium); PAHs (benzo(a)pyrene, 2-methylnaphthalene, and naphthalene); and VOCs (benzene, 1,1'-biphenyl, 1,1,2-trichloroethane, 1,2-dichloroethane, 2-hexanone, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, trichloroethene, toluene, and xylenes).

The future outdoor worker cumulative HI is 3 for both the RME and CTE results (**Tables ES-1** and **ES-2**) due to inhalation of 1,1,2-trichloroethane vapors in total soil.

The current and future child outdoor recreator RME cumulative HI results were above the target HI of 1 due to direct contact with antimony, copper, iron, and nickel in soils. The CTE cumulative

HI results for the child outdoor recreator drop below the EPA cumulative target HI of 1 and metals are no longer identified as noncarcinogenic soil COCs.

The future indoor/outdoor commercial worker RME cumulative HI of 11 drops to 5 for the CTE cumulative HI; however, both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified benzene, naphthalene, toluene, trichloroethene, and xylenes as groundwater VI COCs and 1,1,2-trichloroethane was identified as an inhalation of vapors from soil COC. Trichloroethene and toluene drop out as groundwater COCs for the CTE evaluation.

The future construction worker RME cumulative HI of 16 drops to 7 for the CTE cumulative HI; however, both results remain above the EPA cumulative target HI of 1. The RME evaluation identified benzene, isopropylbenzene, mercury, naphthalene, toluene, and xylenes as groundwater COCs; 1,1,2-trichloroethane was identified as an inhalation of vapors from soil COC. However, 1,1,2-trichloroethane, toluene, manganese, mercury, and xylenes drop out as COCs for the CTE evaluation.

The future child resident RME cumulative HI of 75 drops to 42 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified the following COCs in soil and/or groundwater (**Table ES-4**): metals (aluminum, arsenic, cadmium, cobalt, copper, iron, manganese, mercury, thallium, and vanadium); PAHs (2-methylnaphthalene, benzo(a)pyrene, and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (1,1,2-trichloroethane, 1,1'-biphenyl,1,2-dichloroethane, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, toluene, trichloroethene, and xylenes). However, 1,1'-biphenyl, cis-1,2-dichloroethene, cadmium, cobalt, isopropylbenzene, 2,3,7,8-TCDD TEQ, and vanadium drop out as COCs for the CTE evaluation.

The future adult resident RME cumulative HI of 57 drops to 43 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified similar COCs as the child resident (**Table ES-4**). However, 1,1'-biphenyl, 2-methylnaphthalene, cis-1,2-dichloroethene drop out as groundwater COCs for the CTE evaluation. Even though the future child resident tends to be the more sensitive non-cancer receptor for the residential scenario, the inhalation of indoor air via VI and showering exposure pathways are contributing to the higher future adult resident RME and CTE cumulative HI results. The future child resident is not evaluated for the showering exposure pathway. As shown in **Table ES-4**, benzene and xylenes have high chemical-specific hazard quotients for the future adult resident inhalation indoor air (VI and showering) exposure pathways.

The lead evaluation using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) and Adult Lead Methodology (ALM) models identified lead as a COC for surface soil and total soil for the Central/Southern exposure area. The future outdoor maintenance worker, teen trespasser, construction worker results were above the 5% probability percent threshold for total soil indicating these receptors have greater than 5% chance of having PbB levels over 5 µg/dL. The future child resident results were also above the 5% probability thresholds for surface and total soil. Therefore, potential soil cleanup options need to be explored to prevent potential adverse effects to human health from exposure to lead in soil.

**Northern/Western Exposure Area Cancer Risk Results**:

As shown in **Table ES-3**, the Northern/Western exposure area RME carcinogenic COCs for lifetime resident are primarily metals (arsenic and chromium), PAHs (benzo(a)anthracene, benzo(a)pyrene, and naphthalene), VOCs (1,2-dichloroethane, benzene, chloroform, ethylbenzene, and trichloroethene), and dioxins and furans (2,3,7,8-TCDD TEQ). These results

assume that groundwater is used for potable purposes even though the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

For the future indoor/outdoor commercial worker scenario, the RME evaluation identified PAH naphthalene and VOCs (1,2-dichloroethane, benzene, ethylbenzene) as groundwater VI COCs. Also, chromium was identified as a direct contact with total soil COC. The cumulative RME ELCR results drop from 4E-04 to below the EPA cumulative target ELCR of 1E-04 with 6E-05 in the CTE evaluation (i.e., no soil or groundwater COCs).

For the future lifetime resident scenario, the RME evaluation identified the metal (arsenic); PAHs (benzo(a)pyrene and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (benzene,1,2-dichloroethane, and trichloroethene) as groundwater COCs. Chromium was identified as a RME total soil COC. The cumulative RME ELCR results drop from 3E-03 to a CTE ELCR of 2E-03 which is still above the EPA cumulative target ELCR of 1E-04. The CTE evaluation identified the same carcinogenic COCs as the RME evaluation.

**Northern/Western Exposure Area Non-Cancer Hazard Results**:

As shown in **Table ES-4**, the Northern/Western exposure area RME noncarcinogenic COCs for the indoor/outdoor commercial worker, construction worker, and child and adult resident are metals (aluminum, arsenic, beryllium, cobalt, iron, manganese, mercury, thallium, and vanadium); PAHs (2-methylnaphthalene and naphthalene); VOCs (benzene, 1,1'-biphenyl, 1,2-dichloroethane, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, trichloroethene, toluene, and xylenes); and dioxins and furans (2,3,7,8-TCDD TEQ).

The future indoor/outdoor commercial worker RME cumulative HI of 7 drops to 4 for the CTE cumulative HI; however, both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified VOCs benzene, naphthalene, toluene, trichloroethene, and xylenes as groundwater VI COCs. However, trichloroethene, naphthalene and toluene drop out as groundwater COCs for the CTE evaluation.

The future construction worker RME cumulative HI of 11 drops to 6 for the CTE cumulative HI; however, both results remain above the EPA cumulative target HI of 1. The RME evaluation identified the metal mercury, PAH naphthalene, and VOCs (benzene, isopropylbenzene, toluene, and xylenes) as groundwater COCs. However, isopropylbenzene, toluene, mercury, and xylenes drop out as groundwater COCs for the CTE evaluation.

The future child resident RME cumulative HI of 54 drops to 38 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified the following groundwater COCs (**Table ES-4**): metals (aluminum, arsenic, beryllium, cobalt, iron, manganese, mercury, thallium, and vanadium); PAHs (2-methylnaphthalene, benzo(a)pyrene, and naphthalene); dioxins and furans (2,3,7,8-TCDD TEQ); and VOCs (1,1'-biphenyl,1,2-dichloroethane, cis-1,2-dichloroethene, cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, toluene, trichloroethene, and xylenes). However, beryllium, 1,1'-biphenyl, cis-1,2-dichloroethene, cobalt, iron, isopropylbenzene, 2,3,7,8-TCDD TEQ, and vanadium drop out as groundwater COCs for the CTE evaluation.

The future adult resident RME cumulative HI of 45 drops to 42 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified similar COCs as the future child resident (**Table ES-4**). However, 1,1'-biphenyl, 2-

methylnaphthalene, cis-1,2-dichloroethene drop out as groundwater COCs for the CTE evaluation. Even though the child resident tends to be the more sensitive non-cancer receptor for the residential scenario, the inhalation of indoor air via VI and showering exposure pathways are contributing to the higher adult resident cumulative HI results. The future child resident is not evaluated for the showering exposure pathway. As shown in **Table ES-4**, benzene and xylenes have high chemical-specific hazard quotients for the future adult resident inhalation indoor air (VI and showering) exposure pathways.

In conclusion, the HHRA results indicated that the receptors evaluated for the Upgradient Drainage and Downgradient/Estuarine exposure areas have cumulative ELCR and HI results below the EPA target levels and are eliminated from further evaluation.

The HHRA results indicate that unacceptable risk is possible for the following exposure areas and human receptors:

- Central/Southern exposure area – Future outdoor worker, current/future outdoor recreator (adult/child) exposure to surface and total soil; indoor/outdoor commercial worker exposure to surface and total soil and indoor vapors (VI) from surficial groundwater; future construction worker exposure to total soil, and outdoor vapors (trench) from surficial groundwater; and future hypothetical resident (child/adult) exposure to total soil and surficial groundwater (potable use, VI, and showering/bathing).
- Northern/Western – indoor/outdoor commercial worker exposure to indoor vapors (VI) from surficial groundwater; construction worker exposure to outdoor vapors (trench) from surficial groundwater; future hypothetical resident (child/adult) exposure to surficial groundwater (potable use, VI, and showering/bathing)
- Lead modeling results for the southern portion the Central/Southern exposure area indicate that the future outdoor maintenance worker, teen trespasser, and construction worker results were above the 5% probability percent threshold for total soil indicating these receptors have a greater than 5% chance of having PbB levels over 5 µg/dL. The hypothetical child resident results were also above the 5% probability thresholds for surface and total soil. Adverse health effects from exposure to lead in soil are possible.

The Revised HHRA conservatively assumed that total chromium concentrations were hexavalent chromium because chromium speciation data were not available. Hexavalent chromium is the more toxic form of chromium to human receptors. Chromium is a polyvalent element and can exist in several distinct oxidation states, but only trivalent chromium and hexavalent chromium occur with any frequency in the natural environment. Therefore, chromium cancer risk results may be overestimated.

As noted in **Tables ES-3 and ES-4**, the results of the Background Threshold Values Report (BTV Report) evaluation were incorporated in this Revised HHRA and indicate that after COCs below BTVs are excluded it would not cause the risk results to drop below the cumulative target cancer risk level of 1E-04 or target HI of 1 for receptors that are already exceeding.

# 1. Introduction

AECOM Technical Services, Inc. (AECOM), on behalf of the National Aeronautics and Space Administration (NASA), updated the supplemental field investigation (SFI) report and human health risk assessment (HHRA) for the Restoration Program, Project 15 Construction Debris Landfill (CDL) feasibility study (FS) at the NASA Goddard Space Flight Center's Wallops Flight Facility (WFF) Formerly Used Defense Site (FUDS), Wallops Island, Virginia. WFF qualifies as a U.S. Army Corps of Engineers (USACE) FUDS property pursuant to the Environmental Restoration Defense Account and the Defense Environmental Restoration Program, Chapter 160 of the Superfund Amendments and Reauthorization Act of 1986. As part of the USACE FUDS program, USACE-Baltimore District (CENAB) is responsible for oversight of USACE FUDS activities at the former WFF-FUDS. This work is being performed under contract number 80KSC019D0010, delivery order 80GSFC20F0047with NASA, under the ongoing authorized Environmental Contract.

The Revised HHRA uses soil data, sediment data, surface water data, and groundwater data from six on-site monitoring wells and shallow and deep temporary wells. Data were collected between 2007 and 2017. Pore water data were also collected for the SFI but were not used for the revised HHRA.

WFF is in Accomack County, Virginia, on the Atlantic Coast of the Delmarva Peninsula (**Figure 1-1**), approximately 5 miles south of the Maryland/Virginia state border and immediately west of Chincoteague Island. Bounded on the north and east by Little Mosquito Creek, Simoneaston Bay to the east, and Wattsville Branch to the west, WFF sits at 20 to 30 feet above mean sea level. WFF consists of three separate land areas: Wallops Main Base, Wallops Mainland, and Wallops Island (**Figure 1-2)**. The Project 15 CDL (the CDL Site) is located northeast of the runways on the approximately 2,230-acre main base.

## 1.1 Purpose and Scope of Plan

This Revised HHRA presents a site-specific, quantitative analysis of the site under current and future land use scenarios based on the nature of the human health chemicals of potential concern (COPC) detected in environmental media samples collected from 2007 through 2017, potential exposure pathways to human receptors, and the degree to which these exposures may pose adverse health effects. Compared to the previous risk assessments, the Revised HHRA identified additional contaminants above screening levels and addressed potential exposure pathways that were not previously included. Results of the HHRA will be used to assess risk management options for the CDL Site, including possible further actions to address impacted media.

A quantitative HHRA was completed for the CDL Site to evaluate risks to human health potentially posed by COPC in the affected media beneath and within the vicinity of the site that cannot be eliminated using screening criteria.

## 1.2 Report Organization

This Revised HHRA has been organized into the following sections:

**Section 1** Introduction provides an overview of the objective and organization, identifies the governing risk assessment guidance documents, and summarizes the steps in performing an HHRA.

**Section 2** Data Evaluation describes the data management of each exposure medium and the exposure areas evaluated in the HHRA.

**Section 3** Identification of Chemicals of Potential Concern discusses the screening criteria and presents the COPCs identified in the media of concern.

**Section 4** Exposure Assessment identifies the objectives of the exposure assessment and summarizes the exposure scenarios. It also includes calculation of exposure point concentrations (EPCs) for the COPCs identified in the media of concern for use in the risk calculations.

**Section 5** Human Toxicity Assessment describes the purpose of the assessment and presents health criteria (cancer and noncancer toxicity values) used for COPCs.

**Section 6** Human Health Risk Characterization evaluates potential risks due to exposures to COPCs in soil, groundwater, surface water, and sediment from the CDL Site by integrating toxicity and exposure assessments into quantitative expressions of cancer risk and noncancer health hazards.

**Section 7** Human Health Risk Uncertainty Analysis discusses uncertainties associated with the risk estimates.

**Section 8** Conclusions summarizes the results of the revised HHRA.

**Section 9** References provides a list of sources cited in the preparation of this Revised HHRA.

The following attachments are included with this Revised HHRA:

**Attachment 1** contains the sample identification tables for each exposure area and exposure medium evaluated in the HHRA.

**Attachment 2** presents the risk-based screening results for the detected chemicals in each exposure medium as well as a risk-based screening of the detection limits.

**Attachment 3** provides the intake, dermally absorbed dose (DAD), and exposure concentration (EC) equations used for each receptor as well as the EPCs.

**Attachment 4** describes the fate and transport models and the modeled EPC results.

**Attachment 5** provides the cancer risk and non-cancer hazard calculations.

Attachment tables are denoted with the letter “A” before the Attachment number (e.g., Table A2-1).

## 1.3 Regulatory Framework and Scope

The Revised HHRA is compliant with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, as amended by the Superfund Amendments and Reauthorization Act of 1986 and the Virginia Department of Environmental Quality (VDEQ) risk assessment guidance. The HHRA also follows the U.S. Environmental Protection Agency (EPA) “Risk Assessment Guidance for Superfund (RAGS)” Part A (1989) and subsequent RAGS guidance, which stipulates that a risk assessment addresses the following major steps: Data Evaluation (**Section 2**), Identification of COPCs (**Section 3**), Exposure Assessment (**Section 4**), Toxicity Assessment (**Section 5**), and Risk Characterization (**Section 6**). Each phase of the Revised HHRA were reexamined in an Uncertainty Assessment (**Section 7**) to identify key assumptions, site history, and any lines of evidence that may affect, change or

support the estimates of potential cancer risk and/or non-cancer hazards. The Conclusions (**Section 8**) summarize the results of the Revised HHRA.

# 2. Data Evaluation

This section describes the data management of each exposure medium and the exposure areas evaluated in the HHRA. The Revised HHRA includes all data collected at the CDL Site; this includes data included in the 2013 RI and collected during the SFI. The SFI consisted of several events conducted between May 2015 and November 2017. Field activities included trenching, collecting soil samples from trenches and from direct push technologies (DPT) borings, sampling shallow and deep temporary wells, collecting two rounds of surficial aquifer groundwater samples from monitoring wells, collecting a Yorktown Aquifer groundwater sample from water supply well TOC-06, and collecting pore water and sediment samples from Little Mosquito Creek.

## 2.1 Site Media

The Revised HHRA addresses exposure to the following on-site media:

- Soil - surface soil (0 to 2 feet below ground surface [bgs]) and subsurface soil (2 feet bgs and greater) from four designated areas of concerns (AOCs)
- Groundwater collected from impacted wells located downgradient of the CDL Site and from upgradient potable well TOC well 06
- Sediment collected from the adjacent Little Mosquito Creek
- Surface water collected from the adjacent Little Mosquito Creek

Sample locations are presented on **Figures 3-1** and **3-2** of the SFI Report. **Table A1-2** in **Attachment 1** identifies the sample locations for each medium that are evaluated in the HHRA.

## 2.2 Soil

Based on the historical aerial photographic analysis (U.S. Army Topographic Engineering Center 2000), four AOCs within the CDL Site, shown on **Figure 3-1** of the SFI Report**,** were defined and named with respect to their geographic position to each other: Northern, Central, Southern, and Western AOCs**.** In previous investigations, these AOCs have also been described by the nature of their apparent historical site use:

- Northern AOC – Disturbed Ground – This AOC was an area of disturbed ground in 1949 that was an excavation in 1954.
- Central AOC – Mounds of Material – This AOC was an area with several mounds of unidentified material in 1954 that was an excavation by 1959.
- Southern AOC – Burning Dump – This AOC was an area of disturbed ground with two man-made channels; the AOC's use as a burning ground was confirmed on a 1950 site map.
- Western AOC – Shallow Excavation – This AOC is interpreted to be a shallow excavation that is now located inside the runway area fence.

For the Revised HHRA, soil media were divided into two different exposure areas: Central/Southern and Northern/Western. The Western and Northern AOCs were evaluated together because site investigations did not indicate the presence of buried waste. The

Central and Southern AOCs were evaluated together because the buried waste was present as observed during site investigations.

For the future scenario, a total soil data set was derived by combining surface soil and subsurface soil COPCs. The total soil data set includes all soil samples collected. This consists of samples collected from 0 feet bgs to 17.5 feet bgs in the Northern AOC, 17 feet bgs in the Central AOC, and 9.5 feet bgs in the Southern AOC. No subsurface soil samples were collected in the Western AOC. Future redevelopment activities are considered unlikely, however if they were to occur, they are anticipated to result in the subsurface soil being brought to the surface and “mixed” together.

## 2.3 Groundwater

Groundwater samples were collected from 17 shallow and 4 deep temporary wells and 6 monitoring wells during two rounds of sampling. Samples were collected and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), and Target Analyte List (TAL) metals (total metals from the monitoring wells and dissolved metals from the temporary wells). A subset of samples was analyzed for dioxins and furans. Sample identifiers for the monitoring well, shallow temporary wells, and deep temporary wells include the identifiers MW, DPW, and DTW, respectively. Additionally, two rounds of surficial aquifer groundwater samples were collected from monitoring wells in May and November 2016 and a Yorktown Aquifer groundwater sample was collected from water supply well TOC-06.

## 2.4 Sediment

Sediment samples were collected from the adjacent Little Mosquito Creek. Eleven sediment samples (SD-11 through SD-21) were collected and analyzed for TCL VOCs, TCL SVOCs, TAL metals, and dioxins/furans. Locations SD-11, SD-12, and SD-20 were selected as background locations. Sample identifiers for these sediment samples include the identifier SD. Crabs from Little Mosquito Creek were evaluated as media of potential concern. Concentrations of COPCs in crab tissue were modeled using sediment data and biota sediment accumulation factors (BSAFs) because no direct sampling of crab tissue was performed.

## 2.5 Surface Water

Groundwater at the site flows to the northeast and east towards Little Mosquito Creek; therefore, migration of groundwater to the Creek is a potentially completed pathway. Surface water samples were collected from the adjacent Little Mosquito Creek. Fish from Little Mosquito Creek were evaluated as media of potential concern. Concentrations of COPCs in fish tissue were modeled from surface water data and bioconcentration factors (BCFs) or bioaccumulation factors (BAFs) because no direct sampling of fish tissue was performed.

## 2.6 Data Treatment

The following data treatment was used in the Revised HHRA:

- A duplicate sample is treated as a sample result and is carried forward into the HHRA.

- Per VDEQ guidance (VDEQ, 2020a), non-detect (ND) chemicals (indicated by a “U” or a “UJ” qualifier), will be included in the risk-based screening at one half the method detection limit (MDL) to ensure that the laboratory analyses are protective of risk-based screening levels for measuring potential chemical concentrations at a site. In cases where one half an analyte’s MDL exceeded the VDEQ screening values, the analyte was included in the data sensitivity analysis presented in **Section 7.5**.
- If a result was rejected (indicated by an “R” qualifier), the result was eliminated for that medium.
- Total xylenes were used in place of separate congeners of m,p-xylene and o-xylene.
- Data with “J” qualifiers were assumed to be positive identifications for those media. J indicated that the numerical value is an estimated concentration (i.e., it is reported below the minimum confident sample quantitation limit). The J-flagged results are treated as detected concentrations and addressed qualitatively in the uncertainty assessment (EPA, 1989).
- If a chemical is ND and one half the MDL is lower than the screening level, then it is eliminated from further evaluation.
- The laboratory used toxicity equivalence factors (TEFs) to adjust measured concentrations and one half the MDL for ND dioxin and furan congeners to produce weighted concentrations for each congener in relation to its level of toxicity to 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The adjusted concentrations were summed for each sample to provide a toxicity equivalence (TEQ) concentration for 2,3,7,8-tetrachlorodibenzo-p-dioxin. The 2,3,7,8-TCDD TEQ (ND=0.5) concentrations were carried forward into the HHRA and are considered representative of dioxins and furans at the site (EPA, 2013).

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# 3. Identification of Chemicals of Potential Concern

Identifying the COPCs at the CDL Site is an important step in the risk assessment process. Screening criteria, such as those used in this HHRA, serve to focus the HHRA on COPCs that have the potential to significantly contribute to the calculated risks. According to the VDEQ Guidance Manual (VDEQ, 2020), a chemical with a maximum concentration exceeding the selected screening level is carried forward as a COPC and then quantitatively evaluated in a site-specific HHRA.

## 3.1 Selection of Risk-Based Screening Levels

The maximum concentrations for a detected chemical or one half the MDL for NDs were compared against the corresponding medium-specific screening level. Those chemicals above the corresponding screening level were retained. Chemicals with concentrations below the corresponding screening level were eliminated from further evaluation. The selected screening level criteria for the HHRA are presented in **Table 3-1**. The following screening levels were used for each media:

- Soil (both surface and subsurface) was screened using the May 2021 EPA residential soil regional screening levels (RSLs) (target risk [TR]=1E-06, target hazard quotient [THQ]=0.1). Although the Site is currently industrial, residential RSLs were used to account for the potential teen trespasser and hypothetical future resident.
- Groundwater was screened using the May 2021 EPA Tap water RSLs (TR=1E-06, THQ=0.1) and for vapor intrusion (VI) using the target groundwater concentrations generated in the Vapor Intrusion Screening Level (VISL) calculator (EPA, May 2021 version).
- Sediment was screened using May 2021 residential soil RSLs (TR=1E-06, THQ=0.1) times a multiplication factor of 10 to account for decrease in exposure to sediment.
- Surface water was screened using May 2021 EPA Tap water RSLs (TR=1E-06, THQ=0.1) times a multiplication factor of 10 to account for decrease in exposure to surface water.
- Fish and crabs from Little Mosquito Creek were evaluated as media of potential concern. Concentrations of analytes in fish and crab tissue were modeled from surface water and sediment data because no direct sampling of fish and crabs was performed. Modeled fish and crab tissue concentrations are presented in **Tables A2-15** and **A2-16 Attachment 2**.
    - Crab tissue concentrations were calculated for the downgradient estuarine sediment samples and compared to May 2021 EPA Fish RSLs (TR=1E-06, THQ=0.1).
    - Fish tissue concentrations were calculated for the downgradient estuarine surface water samples and compared to May 2021 EPA Fish RSLs (TR=1E-06, THQ=0.1).
- Surrogates are chemicals with similar molecular structures that were selected to represent chemicals without readily available toxicity information to derive risk-based screening levels. Surrogates are documented in **Table A2-14 Attachment 2**.

- A chemical with no screening level (i.e., no toxicity data) and no appropriate surrogate toxicity value was not further evaluated if no appropriate surrogate chemical were available. If no screening level or no appropriate surrogate toxicity value were available for a chemical, it was noted in the final column of the screening tables titled, “Rationale for Selection/Deletion” (**Tables A2-1** through **A2-13 of Attachment 2**.).
- Metals considered to be essential nutrients (i.e., calcium, magnesium, potassium, and sodium) were eliminated from further evaluation.

The risk-based screening results are provided in **Tables A2-1** through **A2-13 of Attachment 2**. **Table 3-2** summarizes the COPCs for each exposure medium.

RSLs are not available for total chromium. For this risk assessment, total chromium was assumed to be hexavalent chromium because chromium speciation data were not available. Chromium is a polyvalent element and can exist in several distinct oxidation states, but only trivalent chromium and hexavalent chromium occur with any frequency in the natural environment. Without speciated chromium data, it was assumed that only hexavalent chromium, which is the more toxic form to human receptors, was present at the Site. This assumption likely greatly overestimates the risk for this receptor and is discussed further in **Section 7**.

# 4. Exposure Assessment

The site-specific conceptual site exposure model (CSEM) is presented on **Figure 4-1** and on **Table 4-1**, which identifies the potential human receptors and the potentially complete exposure pathways that are addressed in the HHRA. The objectives are to:

- Identify populations that may be potentially exposed to COPCs
- Identify pathways by which such exposures may occur
- Quantify chemical intakes or potential doses based on the magnitudes, frequencies, and durations of these potential exposures

The HHRA evaluates reasonable maximum exposure (RME) and central tendency exposure (CTE) for each receptor. The RME scenario is intended to assess the highest exposure that is reasonably expected to occur at a site. The CTE scenario refers to individuals who have average or typical intake of exposure media (EPA 1989).

The RME exposure assumptions used in the HHRA are presented in **Attachment 3 Tables A3.1.RME** through **A3.12.RME**, and CTE exposure assumptions are presented in **Tables A3.1.CTE** through **A3.12.CTE**.

## 4.1 Environmental Setting and Land Use

The site is bounded on the north and east by Little Mosquito Creek, directly west is the runway for the main base, and south is an open field. Current site features include the Town of Chincoteague Yorktown Well (TOC-6) and a road that runs through the site. The majority of the site is a grassy field, except for the north and eastern edges, which include a wooded and marshy area bordering Little Mosquito Creek. The CDL Site does not have residential or commercial buildings on the site or nearby, and there is a fence surrounding the entirety of the WFF to restrict access. The upland drainage area in the southeast corner of the site is where an outdoor maintenance worker is most likely to spend time maintaining the drainage ways. Little Mosquito Creek runs along the north and east boundaries of the CDL Site; the water is brackish, flows year-round, and supports edible fish and Blue Crab communities. Surface water bodies nearby include Simoneaston Bay to the east and Wattsville Branch to the west.

The HHRA addresses two theoretical scenario timeframes for potential CDL Site receptors (current/future and future only). The current/future scenarios represent exposure to current site conditions; these conditions are assumed to not change in the future (i.e., no land re-development). The current and future exposure scenarios include the outdoor maintenance worker, teen trespasser, and outdoor recreator (child/adult). The future exposure scenarios include the indoor/outdoor commercial worker, construction worker, and hypothetical resident (child/adult). The Site-wide exposure area evaluation for the future on-site hypothetical resident includes potable use of groundwater even though groundwater from the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

No chemicals were detected above screening values in the Town of Chincoteague Yorktown Well (TOC-6), however some ND analytes had MDLs that exceeded screening levels and were therefore included in the data sensitivity analysis presented in **Section 7.5** An off-site current/future resident is addressed for exposure to on-site groundwater

(potable use) in the Yorktown Aquifer. The depth to the aquifer, which is over 100 feet bgs, eliminates VI exposure as a potential pathway of concern.

Direct contact with soil is evaluated for the outdoor maintenance worker, outdoor recreator (child/adult), and teen trespasser. Soil excavation activities with possible land re-development could bring subsurface soil to the surface, and the soils would be "mixed" together. Potential future re-development receptors could be exposed to total soil (surface and subsurface soil combined). The main difference between the current and future scenarios is the soil exposure medium; the current potential receptors are exposed to surface soil, while the future potential receptors are exposed to total soil.

The outdoor recreator (child/adult) could be exposed to surface water and sediment along the boundary of the site and may ingest aquatic organisms (i.e., fish and crabs) caught in the surface water or marsh areas. For the teen trespasser, direct contact with surface water and sediment is evaluated; however, the consumption of crab and fish tissue is not evaluated. The outdoor recreator scenario is considered protective of the teen trespasser scenario for the food consumption exposure pathways.

Potable use of groundwater in the surficial aquifer is addressed using the hypothetical resident scenario because the Site does not prohibit use of groundwater through an environmental covenant. The outdoor maintenance worker is expected to be exposed to groundwater only through inhalation of vapors in outdoor air. Even though there are no commercial or residential buildings on the site or nearby, potential future VI exposure from volatiles identified in groundwater was assessed for the indoor/outdoor commercial worker and hypothetical resident (child/adult).

## 4.2 Current and Future On-Site Land Use Scenarios

The current and future on-site land use scenarios consist of the outdoor maintenance worker, outdoor recreator (child/adult), and teen trespasser. Exposure factors for the RME and CTE scenarios are presented in **Attachment 3 Tables A3-1** through **A3-12. Attachment 3 Tables A3-9** and **A3-10** present the calculated skin surface areas and the teen trespasser body weight that were derived using the EPA (2011) *Exposure Factors Handbook*. **Attachment 3 Table A3-11** presents the derived incidental surface water ingestion rates (EPA, 2019). **Attachment 3 Table A3-12** presents the conversion from wet weight to dry weight for the consumption rates for crab.

### 4.2.1 Outdoor Maintenance Worker

The outdoor maintenance worker periodically visits the Site to inspect the property, patrol for security purposes, and conduct outdoor maintenance activities. The outdoor worker is assumed to be exposed to surface soil (current) and total soil (future), groundwater, surface water, and sediment.

Soil-related exposure pathways include incidental ingestion, dermal contact, and inhalation of wind-blown particulates and/or vapors from soil. EPA standard default exposure parameters for an outdoor worker scenario were used to estimate the RME cancer risk and non-cancer hazards (EPA, 2014). For the CTE evaluation, the exposure frequency (EF) was changed from 225 days per year (days/year) to 200 days/year (professional judgment) to account for inclement or cold weather preventing outdoor work. The RME EPA (2014) soil-to-skin adherence factor (AF) of 0.12 milligrams per centimeter squared per event (mg/cm$^2$-event) was changed to a CTE AF of 0.04 mg/cm$^2$-event which is a geometric mean value for landscaping activities (EPA, 2004). The EPA

standard default soil skin surface area (SA) of 3,527 centimeters squared ($cm^2$) was not changed for the CTE evaluation because the SA was derived using weighted averages of mean values for head, hands, and forearms for males and females, 21 years old and older (EPA, 2014).

A particulate emission factor (PEF) of 1.36 $\times 10^9$ cubic meters per kilogram ($m^3/kg$) and chemical-specific volatilization factors (VFs) were derived for evaluating the inhalation of wind-blown particulates and vapors exposure pathways, respectively, (EPA, 1996 and 2002). **Attachment 4** presents the equations and parameters used to derive the soil-to-outdoor air PEF and chemical-specific VFs used in the Revised HHRA.

Since volatile groundwater COPCs were identified, the outdoor worker may inhale vapors migrating from groundwater to outdoor air during the 8-hour workday. The American Society for Testing and Materials (ASTM) has developed a box model that derives a VF, groundwater-ambient air ($VF_{gw,amb}$) for estimating outdoor air concentrations using groundwater data. **Attachment 4** presents the ASTM (2015) box model, chemical-specific $VF_{gw,amb}$ and modeled outdoor concentrations.

Surface water and sediment-related exposure pathways include incidental ingestion and dermal contact in the upgradient drainage area. **Attachment 3, Table A3-11** presents an adult incidental surface water ingestion rate of 0.0985 liters per day (L/day) for the RME evaluation and 0.044 L/day for the CTE evaluation (EPA, 2019a). An RME EF of 113 days/year and a CTE EF of 100 days/year are assumed for the surface water and sediment exposure pathways, where the outdoor worker spends half of his or her time working outdoors in the drainage areas. An event duration (t-event) of 4 hours per event (hours/event) is assumed for the RME evaluation, and 2 hours/event for the CTE evaluation for the dermal contact with surface water exposure pathway. The SA of 3,527 $cm^2$ is used for the surface water and sediment exposure pathways because it is assumed that the worker is wearing long pants and boots while working in the drainage areas.

### 4.2.2 Child and Adult Outdoor Recreator

The outdoor recreator (child/adult) visits the site for 195 days/year for the RME evaluation (VDEQ, 2020) and 75 days per year (U.S. Department of Energy [DOE], 2020) for the CTE evaluation. EPA standard default residential exposure durations of 20 years (adult) and 6 years (child) were used in the RME evaluation for this scenario, assuming that the outdoor recreator family lives near the site (EPA, 2014). For the CTE evaluation, the adult exposure duration was changed to 7 years to account for the total mean residence time of 13 years (EPA, 2011); the exposure duration for the child outdoor recreator remained at 6 years (i.e., 0 to 6 years old) for the RME and CTE evaluations (EPA, 2014).

The outdoor recreator scenario is assumed to be exposed to surface soil (current) and total soil (future), surface water, and sediment. Recreational fishing is likely to occur in Mosquito Creek, so the consumption of fish and blue crab are evaluated using this receptor.

Soil-related exposure pathways include incidental ingestion, dermal contact, and inhalation of wind-blown particulates and/or vapors from soil. EPA (2014) standard default soil ingestion rates of 100 mg/day (child) and 200 mg/day (adult) were used for the RME evaluation of the incidental ingestion of soil exposure pathway. The ingestion rates were changed to 60 milligrams per day (mg/day) (child) and 30 mg/day (adult) for

the CTE evaluation (EPA, 2017a). EPA (2014) standard default soil SAs of 2,373 $cm^2$ (child) and 6,032 $cm^2$ were used (EPA, 2011) in combination with soil-to-skin AFs of 0.2 (child) and 0.07 (adult) $mg/cm^2$-event for the RME evaluation (EPA, 2014). For the CTE evaluation, the soil-to-skin AFs were changed to geometric mean values of 0.04 (child; daycare children playing outdoors) and 0.01 (adult; grounds keeping activities) $mg/cm^2$-event (EPA, 2004).

EPA default PEF of $1.36 \times 10^9$ $m^3/kg$ and chemical-specific volatilization factors (VFs) were used to derive soil-to-outdoor air concentrations for evaluating the inhalation of wind-blown particulates and vapors exposure pathways, respectively, (EPA, 1996 and 2002). **Attachment 4** presents the equations and parameters used to derive the soil-to-outdoor air PEF and chemical-specific VFs used in the Revised HHRA.

Surface water- and sediment-related exposure pathways include incidental ingestion and dermal contact. **Attachment 3, Table A3-11** presents an adult incidental surface water ingestion rate of 0.0985 L/day for the RME evaluation and 0.044 L/day for the CTE evaluation (EPA, 2019a), assuming one hour is spent in the water of Little Mosquito Creek. A surface water incidental ingestion rate of 0.119 L/day for the RME evaluation and 0.06 L/day for the CTE evaluation was derived for the child outdoor recreator, assuming one hour is spent in the water of Little Mosquito Creek (EPA, 2019a).

In **Attachment 3, Table A3-9**, a surface water and sediment adult (over 21 years old) SA of 7,325 $cm^2$ and a child (0 to 6 years old) SA 2,398 $cm^2$ was derived, assuming head, forearms, hands, lower legs, and feet are exposed (EPA, 2011). The same SA values using time-weighted averages of mean surface area data were used in the RME and CTE evaluations to estimate dermal exposure.

Modeled fish tissue and crab tissue concentrations were derived for bioaccumulative surface water and sediment COPCs, respectively, to evaluate the consumption of fish and crab exposure pathways (EPA 2005a and Oregon Department of Environmental Quality [ODEQ], 2007). A consumption rate of 17.5 grams per day (g/day) for the adult outdoor recreator and a consumption rate of 8.8 g/day for the child outdoor recreator were used for the RME evaluation (ODEQ, 2007 and EPA, 2011). For the CTE evaluation, the consumption rates changed to 5.6 g/day and 2.5 g/day for the adult and child outdoor recreators, respectively (EPA, 2011). The child and adult outdoor recreator eat fish and Blue Crab year-round, but only a quarter of the fish or Blue Crab are wild caught from the Little Mosquito Creek (professional judgment). **Attachment 4** presents the equations and chemical-specific parameters used to derive fish- and crab-tissue concentrations for potential bioaccumulative surface water and sediment COPCs (ODEQ, 2007 and EPA, 2005a).

### 4.2.3 Teen Trespasser

The site is surrounded by fencing; however, a teen trespasser may still scale the fence to gain access to the site. The teen (ages 6 to 16 years old) trespasser with a body weight of 44 kg explores and plays at the site for 24 days per year (same for the RME and CTE evaluations). The teen trespasser is exposed to surface soil (current) and total soil (future), surface water, and sediment.

Soil-related exposure pathways include direct contact with the surface soil (current) and total soil (future) media (i.e., incidental ingestion, dermal contact, and inhalation of wind-blown dust and vapors). In **Attachment 3, Table A3-9**, a soil SA of 3,749 $cm^2$ was derived, assuming head, forearms, hands and lower legs were exposed for 6 to 16-year old children

(EPA, 2011). A soil-to-skin adherence factor of 0.04 mg/cm$^2$-event was selected for the RME evaluation and is representative of a teen soccer player in moist conditions (EPA, 2004); for the CTE evaluation, the AF was changed to 0.01 mg/cm$^2$-event (geometric mean value for soccer players) (EPA, 2004).

Surface water- and sediment-related exposure pathways include incidental ingestion and dermal contact. In **Attachment 3, Table A3-9**, a surface water and sediment SA of 4,639 cm$^2$ was derived, assuming head, forearms, hands, lower legs, and feet are exposed for 6 to <16-year old children (EPA, 2011). **Attachment 3, Table A3-11** presents the incidental surface water ingestion rate of 0.124 L/day for the RME evaluation and 0.041 L/day for the CTE evaluation (EPA, 2019a) that were derived for the teen trespasser, assuming one hour is spent in the water of Little Mosquito Creek.

Even though the teen trespasser may go fishing or crabbing at Mosquito Creek, the consumption of fish or crab tissue is likely to be infrequent and is not evaluated in the Revised HHRA. Instead, the consumption of fish and crab tissue exposure pathway is evaluated under the outdoor recreator (child/adult) scenario which is considered protective of the teen trespasser.

## 4.3 Future Only On-Site Land Use Scenarios

The future-only exposure scenarios include the indoor/outdoor commercial worker, construction worker, and the hypothetical resident (child/adult). These scenarios are used to address site conditions that have changed due to land re-development and/or other potential excavation activities. Residential use of the site is not prohibited by a land-use covenant. Potential future re-development at the site could be construction of a residential or commercial building. **Attachment 3 Tables A3-1** through **A3-12** present the RME and CTE exposure parameters used to estimate cancer risk and non-cancer hazards for the future receptors.

### 4.3.1 Indoor/Outdoor Commercial Worker

The future indoor/outdoor commercial worker spends most of his/her time indoors. The indoor worker is assumed to be exposed to total soil (0 to 10 feet bgs), assuming the land is disturbed during potential future re-development as well as vapors from groundwater that have migrated through the subsurface into outdoor air and indoor air.

Soil-related exposure pathways include incidental ingestion and inhalation of wind-blown particulates and/or vapors from soil. Standard default worker exposure parameters (e.g., 250 days/year for 25 years) that are used to derive EPA's generic "composite worker" RSLs are also used in the RME evaluation for this scenario (EPA, 2021a). For the CTE evaluation, the incidental soil ingestion rate was changed from 100 mg/day to 50 mg/day (EPA, 2017a). Also, the exposure duration was changed from 25 years to 6.7 years (EPA, 2011). The RME EPA (2014) soil-to-skin AF of 0.12 mg/cm$^2$-event was changed to a CTE AF of 0.02 mg/cm$^2$-event which is a geometric mean value for grounds keepers (EPA, 2004). Similar to the outdoor worker scenario, the default soil SA of 3,527 cm$^2$ was not changed for the CTE evaluation since it was derived using weighted averaging of the mean values (EPA, 2011 and 2014).

EPA default PEF of 1.36 ×10$^9$ m$^3$/kg and chemical-specific VFs were used to derive soil-to-outdoor air concentrations for evaluating the inhalation of wind-blown

particulates and vapors exposure pathways, respectively, (EPA, 1996 and 2002). **Attachment 4** presents the equations and parameters used to derive the soil-to-outdoor air PEF and chemical-specific VFs used in the Revised HHRA.

Groundwater-related exposure pathways include inhalation of vapors emanating from groundwater to outdoor air and the VI exposure pathway (i.e., inhalation of indoor air vapors). Volatile groundwater COPCs were identified at the CDL Site. For the RME evaluation, it was assumed that the commercial worker spent the full 8-hour workday either working outdoors for the groundwater-to-outdoor air exposure pathway or working indoors for the VI exposure pathway. For the CTE evaluation, it was assumed that the commercial worker spent 4 hours working outdoors and 4 hours working indoors (professional judgment). The ASTM (2015) box model was used to derive chemical-specific VFgw,amb to model groundwater-to-outdoor air concentrations. EPA's on-line VISL calculator was used to model indoor air concentrations from groundwater (EPA, 2021b). EPA's Johnson and Ettinger VI model was not used for the VI evaluation so as to meet VDEQ (2020) VI requirements. **Attachment 4** presents the models, equations, and parameters used to evaluate the inhalation of vapors from groundwater exposure pathways.

### 4.3.2 Construction Worker

The future on-site construction worker is assumed to be involved in a 1-year-long construction project (i.e., 250 days/year out of a year) at the Site for the RME evaluation and a 6-month long construction project (i.e., 125 days/year out of half a year) for the CTE evaluation.

Soil-related exposure pathways include incidental ingestion, dermal contact, and inhalation of wind- blown particulates and/or vapors from total soil (0 to 10 feet bgs). The RME incidental soil ingestion rate of 330 mg/day was changed to 100 mg/day (upper percentile general population adult soil and dust value) for the CTE evaluation (EPA, 2002 and 2017a); upper percentile values were used for both evaluations since the construction worker scenario represents intensive soil exposure during excavation activities. For the dermal exposure pathway, the soil-to-skin AF of 0.3 mg/cm$^2$-event (95$^{th}$ percentile value for construction workers) was changed to a CTE AF of 0.1 mg/cm$^2$-event, which is a geometric mean value for construction workers (EPA, 2004).

A construction worker subchronic unpaved roads PEF of 1.06 ×10$^7$ m$^3$/kg was derived, and chemical-specific VFs specific to construction worker exposure were generated to derive soil-to-outdoor air concentrations for the inhalation of wind-blown particulates and vapors exposure pathways, respectively (EPA, 1996 and 2002). **Attachment 4** presents the equations and parameters used to derive the soil-to-outdoor air PEF and chemical-specific VFs used in the Revised HHRA.

Groundwater occurs above 15 feet bgs at the site; therefore, incidental ingestion, dermal contact, and inhalation of groundwater vapors with shallow groundwater seeping into an excavation trench for a building or structure were evaluated. An incidental ingestion rate for groundwater was assumed to be 0.028 L/day for the RME and CTE evaluations (EPA, 2019). VDEQ (2020) construction worker trench model was used to estimate outdoor air concentrations within the trench. For the RME evaluation, the EF was assumed to be 125 days/year, with an exposure time of 4 hours each day for time spent in the trench during the construction project; these exposure parameters are VDEQ (2020) model default

values. For the CTE evaluation, the EF and exposure time were changed to 65 days/year for 2 hours each day spent in the trench (professional judgment). **Attachment 4** describes the VDEQ construction worker trench model and the modeled results.

### 4.3.3 Hypothetical Resident

There are currently no residential receptors on the site, and the site is not zoned for residential use and is not likely to be in the future; however, a residential adult/child exposure scenario was evaluated in the HHRA as a conservative measure of hypothetical future site use to provide information for decision-making purposes. Standard default residential exposure parameters (e.g., 350 days/year for 26 years) that are used to derive EPA's generic residential RSLs are also used in the RME evaluation for this scenario (EPA, 2021a and 2014). For the CTE evaluation, the adult exposure duration was changed to 7 years to account for the total mean residence time of 13 years (EPA, 2011); the exposure duration for the child resident remained at 6 years (i.e., 0 to 6 years old) for the RME and CTE evaluations (EPA, 2014).

Soil-related exposure pathways include incidental ingestion, dermal contact, and inhalation of wind- blown particulates and/or vapors from total soil (0 to 10 feet bgs). EPA (2014) standard default incidental soil ingestion rates of 100 mg/day (child) and 200 mg/day (adult) were used for the RME evaluation. The ingestion rates were changed to 60 mg/day (child) and 30 mg/day (adult) for the CTE evaluation (EPA, 2017a). EPA (2014) standard default soil SAs of 2,373 $cm^2$ (child) and 6,032 $cm^2$ were used (EPA, 2011) in combination with soil-to-skin AFs of 0.2 (child) and 0.07 (adult) $mg/cm^2$-event for the RME evaluation (EPA, 2014). For the CTE evaluation, the soil-to-skin AFs were changed to geometric mean values of 0.04 (child; daycare children playing outdoors) and 0.01 (adult; grounds keeping activities) $mg/cm^2$-event (EPA, 2004).

Groundwater-related exposure pathways include ingestion, dermal contact, and inhalation of vapor while bathing and from vapor intrusion. EPA (2014) standard default groundwater ingestion rates (assuming potable use) of 2.5 L/day (adult) and 0.78 L/day (child) were used for the RME evaluation. These values were changed to 2 L/day (adult) and 0.21 L/day (child) for the CTE evaluation (EPA, 1991 and 2019). In addition, EPA (2014) standard default event durations (t-event) of 0.71 hours/event (adult) and 0.54 hours/event (child) for the dermal contact with groundwater while showering or bathing. For the CTE evaluation, the t-events were changed to 0.33 hours/event (adult; mean value for time spent showering) and 0.4 hours/event (child; mean value for time spent bathing) (EPA, 2011). For the VI exposure pathway, the RME evaluation uses the EPA (2014) standard default exposure parameters. The primary change for the CTE evaluation is the reduced exposure duration of 13 years for the lifetime resident (EPA, 2011).

Volatile groundwater COPCs were identified at the CDL Site. It is assumed that the adult resident is the most likely to shower, so the child resident was not evaluated for this pathway; however, the child resident bathing parameters were factored into the lifetime resident mutagenic calculations. It was assumed that the adult resident spends a total time of 1 hour in the bathroom for the RME evaluation EPA, 2011); the total time was reduced to 0.71 hours/event for the CTE evaluation (EPA, 2014).

## 4.4 Current and Future Off-Site Land Use Scenario

Town of Chincoteague well TOC-6, located on-site, pumps potable water from the Yorktown Aquifer and could be consumed by an off-site resident. Groundwater-related exposure

pathways include ingestion, dermal contact, and inhalation of vapor while showering or bathing. The depth to the aquifer, which is over 100 feet bgs, eliminates VI exposure as a potential pathway of concern. The same EPA standard default residential exposure parameters used for the RME and CTE evaluations for the Hypothetical Resident (**Section 4.3.3**) were used for this receptor. This scenario is used for the data sensitivity analysis only because no detected analytes exceeded screening values in the Town of Chincoteague well TOC-6.

No other off-site receptors were identified for the CDL Site.

## 4.5 Chemical Intake and Exposure Concentrations

**Tables A3-1** through **A3-12** of **Attachment 3** present the chemical intake, DAD, and EC equations and exposure parameters used for each of the current and future and future only scenarios. Where possible, the EPA updated standard default exposure parameters were used (EPA, 2011 and 2014). **Tables A3-13** through **A3-27** of **Attachment 3** contain the EPA ProUCL Version 5.1 input, output, and summary statistics tables for the HHRA.

## 4.6 Exposure Point Concentrations

The concentrations of COPCs that a potential receptor may come into contact with are referred to as EPCs. EPA RAGS (EPA, 1989) recommends using the lower of the maximum detected concentration and the upper confidence limit (UCL) of the mean as the EPC in cases where the exposure area is reasonably defined. For some chemicals, a UCL was not calculated because the sample data set was a small size (less than 10 results) and/or the detection frequency was low. For both the RME and CTE scenarios, EPCs are equal to the UCL or the maximum detected concentration, whichever is lower (EPA, 1989).

The EPCs were derived using approved statistical methodologies for calculating the UCL of the mean. ProUCL Version 5.1 software, which was developed for EPA, was used to test the distribution of the data sets (EPA, 2016a). After testing, the program computes a conservative UCL based on the appropriate distribution of the data. For those data sets that do not fit the normal, lognormal, or gamma distributions, several parametric and distribution-free non-parametric methods are available to calculate an appropriate UCL (e.g., bootstrap methods). The ProUCL Version 5.1 program uses several statistical methods to handle data sets with and without ND results.

**Tables A3-13** through **A3-27** of **Attachment 3** present the ProUCL input and output tables, summary statistics, and selected EPCs for each exposure medium.

For indirect exposure pathways, **Attachment 4** provides a description of the fate and transport models that were used to model the indirect EPCs in the HHRA. **Tables A4-1 through A4-14** presents the modeled EPC results. **Table 4-2** presents the transport and fate models that were used.

## 4.7 Lead Evaluation

Because most human health effects data for lead are correlated with concentrations in the blood rather than an external dose, the standard cancer risk and non-cancer hazard approach for evaluating health effects cannot be applied to lead. Lead is, therefore, assessed separately from carcinogens and noncarcinogens. The lead residential RSLs are considered action levels because they were derived using EPA's Integrated Exposure-Uptake Biokinetic (IEUBK) model (EPA, 2021a and 2010). For risk-based screening, the

maximum detected concentration in soil was compared to an action level of200 milligrams of chemical per kilogram (mg/kg), which is one half the EPA Region 3 residential soil screening level (EPA, 2021a). One half the EPA Region 3 residential soil screening level was used to account for future proposed policy changes by the EPA and to match with the lead screening methodology used at other sites at the WFF. The maximum detected concentration in groundwater was compared to the EPA tap water RSL of 15 micrograms per liter (µg/L).

The risk-based screening results presented in **Tables 4-3 and 4-4** identified lead as a COPC in total soil at the Central AOC, surface and total soil at the Southern AOC, and in groundwater. Lead sampling summary statistics are presented below. Lead was not identified as a COPC in any other media.

EPA (2010) recommends using the mean concentration as the EPC for evaluating risk from exposure to lead. The mean concentration in side-wide groundwater is below the lead action level of 15 µg/L; therefore, no further modeling was necessary for groundwater.

The mean lead concentration in the Central AOC total soil and Southern AOC surface and total soil samples is above the lead action level of 200 mg/kg; therefore, further modeling is necessary for the Central AOC total soil and Southern AOC.

### 4.7.1 Lead Model Parameters and Exposure Point Concentrations

The EPA has developed the following two models to estimate the receptor blood lead concentrations (PbB) and what percentage of the exposed population may have PbB levels above the allowable PbB threshold:

- Adult Lead Methodology (ALM) (version date 6/14/17) model

IEUBKwin version 2 (May 2021) Children are more vulnerable to lead poisoning than adults because their nervous system is still developing. Children can be exposed to lead in their environment and prior to birth from lead in their mother's body. At lower levels of exposure, lead can decrease mental development, with effects on learning, intelligence, and behavior. The EPA ALM and IEUBK models are designed to estimate PbB levels for the fetus of a female worker (i.e., body burden from exposure to lead) and a hypothetical child, respectively (EPA, 2017b and 2010). The ALM model was used to evaluate soil exposure to the current and future outdoor maintenance worker, teen trespasser, as well as the future construction worker receptors. The IEUBK model was used to evaluate soil exposure to the hypothetical future child resident receptor. The hypothetical child resident is also protective of a young child outdoor recreator.

**Table A4-15** through **A4-19** presents the exposure parameters used to evaluate lead in soil using the ALM and IEUBK models (EPA, 2017c and 2017d). The mean concentration was used as the exposure point concentration (EPC) (EPA, 2019b). Microsoft® Excel was used as the calculation tool to derive the mean concentrations. **Table 4-5** presents the mean concentrations that were used in lead modeling.

#### 4.7.1.1 Target Risk Levels

Lead exposure was evaluated by comparing the estimated PbB to EPA's target PbB threshold of 5 µg/dL for the young child resident and the fetus of a teen trespasser or female worker (i.e., body burden from exposure to lead) receptor populations. The target PbB threshold is based on potentially adverse neurological effects in children (Centers for Disease Control and Prevention [CDC], 1991 and 2012). In addition, the threshold for lead

is to limit the risk to no more than a 5% probability for the receptor's population PbB to exceed the selected target PbB threshold in the ALM and IEUBK model (EPA, 2017b and 2010). If the probability of 5% is exceeded, then adverse health effects from exposure to lead are possible.

The potential risks are only estimates and are based on intentionally conservative exposure and toxicity assumptions. Exceedance of any particular risk level does not imply that adverse health effects have already occurred or will occur. The estimates are an indication that additional evaluation or action may be warranted.

#### 4.7.1.2 Lead Modeling Results

**Table 4-5** summarizes the ALM and IEUBK lead modeling results for surface and total soil for each receptor. The current outdoor maintenance worker and teen trespasser ALM model results were below the PbB and probability percent thresholds for Central AOC total soil and Southern AOC surface soil. The future construction worker model results were below the PbB and probability percent thresholds for Central AOC total soil.

The future outdoor maintenance worker, teen trespasser, and construction worker, ALM model results for total soil at Southern AOC were above the target PbB threshold of 5 µg/dL and the probability threshold of 5% indicating that adverse health effects from exposure to lead are possible.

The hypothetical child resident IEUBK model results were above the target PbB threshold of 5 µg/dL and probability threshold of 5% for total soil at the Central AOC and all soil at Southern AOC, indicating that that adverse health effects from exposure to lead are possible.

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# 5. Toxicity Assessment

Risk assessments vary for different chemicals depending on whether noncarcinogenic or carcinogenic responses are used to assess potential risks. Some COPCs may result in both noncarcinogenic and carcinogenic effects. Toxicity assessment involves determining whether exposures to a chemical can increase the incidence of a specific adverse effect (e.g., cancer, kidney damage) in humans, characterizing the nature and strength of evidence of causation and, if sufficient data are available, quantifying the relationship between the dose of the chemical and the incidence of adverse health effects in the exposed population. Toxicity assessments provide the basis for evaluating the acceptable exposure and the level of exposure that may adversely affect human health.

## 5.1 Selection of Toxicity Values

**Tables A5-1, A5-2, A6-1,** and **A6-2** of **Attachment 5** present the toxicity values used in the HHRA. The toxicity assessment was conducted in accordance with USEPA guidance and considers chronic (long-term) and subchronic (less-than-lifetime) exposures for carcinogenic and noncarcinogenic COPCs. The EPA's guidance regarding the hierarchy of sources of toxicity values in risk assessment was followed (EPA 2003, 2021a) and is presented below:

**Tier 1 – EPA's Integrated Risk Information System (IRIS) (EPA, 2021c)** – The IRIS program supports protection of human health and the environment by identifying and characterizing the health hazards of chemicals found in the environment. Each assessment can cover a chemical, a group of related chemicals, or a complex mixture. The online IRIS database is found here:

https://www.epa.gov/iris

**Tier 2 – EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)** – The Office of Superfund Remediation and Technology Innovation develops PPRTVs on a chemical-specific basis:

https://www.epa.gov/pprtv/provisional-peer-reviewed-toxicity-values-pprtvs-assessments

**Tier 3 – EPA's Office of Pesticide Programs (OPP) Human Health Benchmarks for Pesticides (HHBP) –** The OPP lists 363 pesticides in the HHBP table that are no longer updated in EPA's IRIS. The online HHBP tables are listed here: https://iaspub.epa.gov/apex/pesticides/f?p=HHBP:home

**Tier 4 – Other Toxicity Values** – Tier 4 includes additional EPA and non-EPA sources of toxicity information. Priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and that have been peer reviewed. Some examples of Tier 4 sources include the following:

- The California EPA (Cal EPA) toxicity values are peer reviewed and address both cancer and non-cancer effects (Cal EPA, 2021). Cal EPA toxicity values are available on the Cal EPA website at http://oehha.ca.gov/chemicals
- The Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) are estimates of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer health effects over a specified duration of exposure. The ATSDR MRLs are peer reviewed and are available on the ATSDR website at http://www.atsdr.cdc.gov/mrls/index.asp (ATSDR, 2021).

- Health Effects Assessment Summary Tables (HEAST) dated July 1997 (EPA, 1997). HEAST is found online at https://epa-heast.ornl.gov/

Where toxicity values were not available for a chemical, toxicity values based on surrogate chemicals (i.e., chemicals with structural similarities) were identified.

## 5.2 Noncarcinogenic Health Effects

Evaluation of noncarcinogenic effects is based on the assumption that noncarcinogenic toxicological effects of chemicals occur only after a threshold dose is achieved. The reference dose (RfD) is used to evaluate ingestion and dermal exposure pathways, and the reference concentration (RfC) is used to evaluate the inhalation pathway. The RfD and RfC are estimates of the threshold dose (or concentration) at which the most sensitive human population may experience an observed adverse effect for that compound.

The EPA defines a chronic RfD/RfC as an estimate of a daily exposure level for the human population that is unlikely to result in deleterious effects during a lifetime (i.e., 70 years). A chronic RfD/RfC is used to evaluate the potential noncarcinogenic hazards associated with long-term chemical exposures. Chronic toxicity values are used to evaluate all scenarios in this HHRA except for the construction worker scenario. Subchronic toxicity values are applicable to the construction worker scenario where exposures are expected to occur over a brief (i.e., one year) duration. The chronic and subchronic RfDs and RfCs, as well as their corresponding target organ(s), are provided in **Tables A5-1, A5-2, A6-1,** and **A6-2** of **Attachment 5.**

## 5.3 Carcinogenic Health Effects

The EPA requires that potential carcinogens be evaluated as if minimum threshold doses do not exist (1989). The EPA has established a weight-of-evidence approach to evaluating whether a particular chemical is a carcinogen (EPA, 1986). This weight-of-evidence classification is as follows:

- Group A chemicals are known carcinogens for which there is sufficient evidence to support a causal association between exposure to the agents in humans and cancer.
- Group B1 chemicals are probable human carcinogens for which there is limited evidence of carcinogenicity in humans.
- Group B2 chemicals are probable human carcinogens for which there is sufficient evidence of carcinogenicity in animals but inadequate or no human data.
- Group C chemicals are possible human carcinogens for which there is limited evidence of carcinogenicity in animals and inadequate or no human data.
- Group D chemicals are not classifiable as to human carcinogenicity, as there is inadequate human and animal evidence of carcinogenicity, or no data are available.
- Group E chemicals show evidence of non-carcinogenicity in humans, as there is no evidence of carcinogenicity from either human or animal studies.

In 2005, the EPA published new guidelines for carcinogenic risk assessment (EPA, 2005b). The 2005 guidelines recognize the growing sophistication of research methods; therefore, the EPA is revising the weight of evidence classification system. Weighing of the evidence includes addressing not only the likelihood of human carcinogenic effects of the agent but also the conditions under which such effects may

be expressed to the extent that these are revealed in the toxicological and other biologically important features of the agent. There are five recommended standard hazard descriptors under the new guidance:

“Carcinogenic to Humans”

“Likely to Be Carcinogenic to Humans”

“Suggestive Evidence of Carcinogenic Potential”

“Inadequate Information to Assess Carcinogenic Potential”

“Not Likely to Be Carcinogenic to Humans”

The EPA is currently re-examining the carcinogenic classification for numerous chemicals; where available, the new classification is provided in **Table A6-1** and **A6-2** of **Attachment 5** for the COPCs evaluated in this HHRA.

The cancer slope factor (CSF) is used to estimate the incremental risk from exposure to carcinogenic COPCs. CSFs are developed based on a dose response curve for carcinogenicity of the specific chemical. In estimating risks posed by potential carcinogens, the EPA generally assumes that any exposure level is associated with a finite probability, however minute, of producing a carcinogenic response. This mechanism for carcinogenicity is referred to as “non-threshold” because there is theoretically no level of exposure for a substance that does not pose a small, though finite, probability of producing a carcinogenic response.

The CSF, expressed in units of 1/milligrams per kilogram-day (mg/kg-day)$^{-1}$, is used to convert the chronic daily intake (CDI) of a chemical from ingestion and dermal exposures, normalized over a lifetime, directly to a cancer risk. To evaluate inhalation exposure, the CSF is expressed as an inhalation unit risk (IUR) in units of 1/micrograms per cubic meter ($\mu g/m^3$)$^{-1}$ and is used to convert the adjusted EC in units of $\mu g/m^3$ directly to a cancer risk. Cancer toxicity data are derived for those chemicals in classes A, B1, and B2. The CSFs and IURs are summarized in **Table A6-1** and **A6-2** of **Attachment 5**.

Some chemicals are identified as mutagens. A mutagen adversely affects the deoxyribonucleic acid (DNA) of a receptor; the mutated DNA causes malfunctioning or loss of function for a particular gene(s), and the accumulation of mutations may lead to cancer. EPA has developed equations to address mutagenic health effects, especially for age-sensitive or developmental stages where mutagenic health effects are likely to occur (EPA 2005c). EPA recommends using age dependent adjustment factors (ADAFs) to quantify potential cancer risks for child receptors (EPA, 2005c). An ADAF of 10 is used for exposures occurring less than 2 years of age, an ADAF of 3 was used for exposures occurring between 2 and less than 16 years of age, and an ADAF of 1 is used for exposures occurring after 16 years of age (EPA, 2005c). These ADAFs are used to quantify potential cancer risks for the child/adult outdoor recreator, on-site child/adult hypothetical resident, off-site child/adult resident, and teen trespasser for all exposure pathways (i.e., ingestion, dermal contact, and inhalation). Mutagenic COPCs evaluated in the Revised HHRA include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, hexavalent chromium, indeno(1,2,3-cd)pyrene, trichloroethylene, and vinyl chloride.

Some chemicals such as TCE and vinyl chloride require specialized intake and EC equations. For TCE, two toxicity value adjustment factors are used to account for carcinogenic adjustment factors (CAF) and mutagenic adjustment factors (MAF) health effects. Early life exposure to vinyl chloride may result in cancer during childhood as well as contribute to cancers later in life. Infants and young children tend to be more susceptible than adults in regard to vinyl chloride-induced cancer (EPA, 2021c). The mutagenic and specialized equations are documented in **Attachment 3**.

## 5.4 Absorption Factors

Dermal toxicity values are not available in the EPA's IRIS or other sources (EPA, 2021c). To evaluate risk/hazard from dermal routes of exposure, EPA dermal guidance documents (EPA, 2016b and 2004) were used. EPA (EPA, 2004) guidance recommends adjusting oral toxicity values using gastrointestinal absorption factors (GIABS) to evaluate dermal exposure routes for some chemicals. The oral-to-dermal adjustment is not required for all chemicals where 100% (GIABS of 1) absorption is assumed. For cancer toxicity data, the oral CSF is divided by the GIABS to derive the dermal CSF. For non-cancer toxicity data, the oral RfD is multiplied by the GIABS to derive the dermal RfD. The GIABS values are presented in **Attachment 4**.

For dermal contact with soil, an absorption fraction (ABS) is used to estimate desorption of a chemical from the soil and its absorption across the skin (EPA, 2016b and 2004). **Attachment 4** presents the soil ABS values used in the HHRA.

Metals can exist in a variety of chemical and physical forms in the environment, and not all forms of a given metal are absorbed to the same extent. The relative bioavailability factor (RBA) is the fraction of an ingested dose that crosses the gastrointestinal epithelium and becomes available for distribution to internal target tissues and organs (EPA, 2007). The HHRA uses an RBA of 0.6 to account for the difference in oral bioavailability of arsenic in soils (EPA, 2007). An RBA of 1 is assumed for all the other soil COPCs.

For dermal exposure to groundwater and surface water, a chemical-specific permeability coefficient (Kp) is used to estimate chemical absorption from water through the skin of the receptor. It is assumed that the absorption continues after the exposure has ended, i.e. the final absorbed dose (DAevent) is estimated to be the total dose dissolved in the skin at the end of the exposure (EPA, 2004). **Tables A4-7** and **A4-8** in **Attachment 4** present the KPs used in the DAevent calculations.

# 6. Risk Characterization

Risk characterization summarizes the nature and magnitude of the potential for occurrence of adverse health effects under a specific set of conditions. The exposure assessment and the toxicity assessment are integrated into quantitative estimates of potential health risks to potential receptors.

Potential carcinogenic and noncarcinogenic human health risks are calculated and summarized individually for each receptor exposed to COPCs in the affected site media. Estimated risks are combined across COPCs and exposure pathways, as appropriate.

## 6.1 Target Risk Levels

Various state and federal regulatory agencies mandate target or “acceptable” carcinogenic risk and noncarcinogenic hazard levels. The VDEQ regulations establish a target cumulative risk level (i.e., from all pathways for a single receptor group) of $1\times10^{-4}$ (1E-04) for potential excess lifetime cancer risk (ELCR). The EPA identifies the acceptable cancer risk range to be $1\times10^{-4}$ to $1\times10^{-6}$ (1E-04 to 1E-06). In effect, estimated ELCR that are less than $1\times10^{-6}$ (1E-06) are generally considered negligible. Potential ELCR in the intermediate range between $1\times10^{-4}$ to $1\times10^{-6}$ (1E-04 to 1E-06) can be considered acceptable on a case-by-case basis. The cancer risk of $1\times10^{-6}$ is used as the risk goal for individual carcinogens, with a not-to-exceed ELCR of $1\times10^{-4}$ for all carcinogens. Both the VDEQ and EPA accept a noncarcinogenic hazard target level, or HI, of 1.

The risk assessment process generally incorporates exposure assumptions that are based on conservative exposure scenarios (i.e., based on reasonable maximum exposure). Therefore, the risks calculated in this HHRA represent reasonable upper bound risks the receptor groups evaluated for the site may incur. The actual risks that could be incurred by these receptor groups are likely to be much lower. **Section 7.0** summarizes the uncertainties associated with the calculation of risk levels in this HHRA.

## 6.2 Carcinogenic Risks

The CSF converts estimated daily intakes to an estimate of incremental cancer risk. As noted earlier, the CSFs are generally upper-bound estimates. This means “true risk” probably does not exceed the risk estimate generated using the CSFs and is likely to be less than the risk predicted using this method. The cancer risk estimate, which is unitless, represents an estimation of an upper-bound incremental lifetime probability that an individual will develop cancer as a result of exposure to a potential carcinogen.

Carcinogenic risk is calculated for each chemical and exposure pathway (ingestion and dermal) by multiplying the estimated CDI by the CSF, as follows:

**Equation 1:**

Cancer Risk (unitless) = CDI (mg/kg-day) × oral CSF $(\text{mg/kg-day})^{-1}$

For the dermal contact pathway, the DAD is multiplied by the dermal CSF:

**Equation 2:**

Cancer Risk (unitless) = DAD (mg/kg-day) × dermal CSF $(\text{mg/kg-day})^{-1}$

For the inhalation pathway, the IUR and the adjusted EC (in units of concentration in air) are used:

**Equation 3:**

Cancer Risk (unitless) = EC ($\mu g/m_3$) × IUR $(\mu g/m^3)^{-1}$

Chemical-specific risks for all chemicals associated with a specific pathway are summed to assess exposure to multiple chemicals. The pathway-specific risks for all pathways and exposure media are then summed to determine the potential ELCR for each exposure scenario. The potential ELCR assumes that different carcinogens affect the same target organ to produce a cancer response, ignoring potential antagonistic or synergistic effects or disparate effects on different target organs.

The VDEQ regulations establish a target cumulative risk level (i.e., from all pathways for a single receptor group) of $1 \times 10^{-4}$ for carcinogenic risks. **Tables 7.1.RME/CTE** through **7.39.RME/CTE and Tables 9.1RME/CTE to 9.39RME/CTE** of **Attachment 5** present the cancer risk results calculated for each receptor in this HHRA. **Table 6-1 and 6-2** summarize the cancer risk results for RME and CTE, respectively. **Table 6-3** presents the carcinogenic COCs that are contributing to unacceptable ELCR results for each receptor and exposure area.

## 6.3 Noncarcinogenic Risks

To characterize potential noncarcinogenic effects, comparisons are made between projected intakes of substances over a specified time period and toxicity values, primarily RfDs and RfCs. The ratio of exposure to toxicity value is the Hazard Quotient (HQ). The HQ is calculated for each chemical and exposure pathway (ingestion and dermal) by dividing the CDI by the RfD as follows:

**Equation 4:**

Non-cancer HQ (unitless) = CDI (mg/kg-day)/oral RfD (mg/kg-day)

For the dermal contact pathway, the DAD is divided by the dermal RfD.

**Equation 5:**

Non-cancer HQ (unitless) = DAD (mg/kg-day)/dermal RfD (mg/kg-day)

For inhalation exposures, a similar comparison is made using the RfC, the adjusted EC, and a unit's conversion factor:

**Equation 6:**

Non-cancer HQ = EC $(\mu g/m^3)$/(RfC $[mg/m^3]$× 1000 µg/mg)

Estimated HQs for noncarcinogenic effects are generated on a chemical-by-chemical basis for each relevant pathway of exposure. The chemical-specific HQs are summed for all chemicals associated with a specific pathway to determine the pathway-specific HI. The HQs for all pathways and exposure media are then summed to determine the cumulative HI for each exposure scenario.

The HQ is not a statistical probability of a noncarcinogenic effect occurring. If the exposure level is less than the appropriate toxicity value (i.e., the HQ is less than 1), adverse health effects are not likely, even with a lifetime of exposure. Given the uncertainty factors used in deriving RfDs and RfCs, an HQ greater than 1 may not indicate a higher risk of adverse effect than an HQ of 1 or less than 1.

If the cumulative HI for an exposure scenario is greater than 1, indicating potential cause for concern, the HI is segregated by critical effect and mechanism of action (EPA, 1989). HQs only for chemicals that affect the same target organ are summed to derive target organ-specific HIs.

**Tables 7.1.RME/CTE** through **7.39.RME/CTE** and **Tables 9.1RME/CTE** through **9.39RME/CTE** of **Attachment 5** present the non-cancer hazard results calculated in this HHRA. The VDEQ regulations establish a target HI (i.e., from all pathways for a single receptor group) of 1 for non-cancer HI. **Table 6-1** and **6-2** present the current/future and future scenario non-cancer hazard results for RME and CTE, respectively. **Table 6-4** presents the noncarcinogenic COCs that are contributing to unacceptable target organ-specific HI results for each receptor and exposure area.

## 6.4 Summary of HHRA Results

The RME and CTE results for the Upgradient Drainage and Downgradient/Estuarine exposure areas are below the EPA cumulative ELCR and HI target levels and are eliminated from further evaluation in the Revised HHRA. The carcinogenic and/or noncarcinogenic results for some receptors at the Central/Southern and Northern/Western exposure areas were above EPA target cumulative levels and are discussed further below.

### 6.4.1 Central/Southern Exposure Area

**Central/Southern Exposure Area Cancer Risk Results:**

As shown in **Table 6-3**, the Central/Southern exposure area RME carcinogenic COCs for the current and future lifetime outdoor recreator, future indoor/outdoor commercial worker, and future hypothetical lifetime resident scenarios are primarily metals; semi-volatile organic compounds (SVOCs); dioxins and furans (i.e., 2,3,7,8-Tetrachlorodibenzo-p-dioxin toxicity equivalence [2,3,7,8-TCDD TEQ]); and volatile organic compounds (VOCs) in groundwater and/or soil (surface and total). These results assume that the Central/Southern groundwater is used for potable purposes even though the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

The Central/Southern exposure area RME and CTE evaluation indicates that the cumulative ELCR results drop from 6E-04 to 1E-04, respectively, for the current lifetime outdoor recreator scenario (**Tables 6-1 and 6-2**). As shown in **Table 6-3**, the RME evaluation for current lifetime outdoor recreator identified two metals (arsenic and total chromium) as surface soil COCs, only one (total chromium) remained a COC in the CTE evaluation.

The RME evaluation for the future lifetime outdoor recreator identified metals, SVOCs, 2,3,7,8-TCDD TEQ, and one VOC as total soil COCs. The future lifetime outdoor recreator scenario cumulative RME ELCR results are 3E-04 but the ELCR drops below the EPA cumulative target ELCR of 1E-04 in the CTE evaluation (i.e., no total soil COCs).

For the future indoor/outdoor commercial worker scenario, the RME evaluation identified metals; one SVOC; and one VOC as soil COCs. For groundwater, VOCs were identified as VI COCs. The cumulative RME ELCR results drop from 4E-04 to below the EPA cumulative target ELCR of 1E-04 in the CTE evaluation (i.e., no soil or groundwater COCs).

For the future lifetime resident scenario, the RME evaluation identified metals; SVOCs; 2,3,7,8-TCDD TEQ; and VOCs as soil and/or groundwater COCs. The cumulative RME ELCR results drop from 3E-03 to CTE ELCR of 2E-03; two VOCs and one SVOC are no longer identified as carcinogenic COCs for soil in the CTE evaluation.

**Central/Southern Exposure Area Non-Cancer Hazard Results:**

As shown in **Table 6-4**, the Central/Southern exposure area RME noncarcinogenic COCs for the future outdoor worker, child outdoor recreator, construction worker, indoor/outdoor commercial worker, and child and adult resident are primarily metals; SVOCs; 2,3,7,8-TCDD TEQ; and VOCs.

The future outdoor worker cumulative HI is 3 for both the RME and CTE results (**Tables 6-1** and **6-2**) due to inhalation of 1,1,2-trichloroethane (VOC) vapors in total soil.

The current and future child outdoor recreator RME cumulative HI results were above the target HI of 1 due to direct contact with metals in soils. The CTE cumulative HI results for the child outdoor recreator drop below the EPA cumulative target HI of 1 and metals are no longer identified as noncarcinogenic soil COCs.

The future indoor/outdoor commercial worker RME cumulative HI of 11 drops to 5 for the CTE cumulative HI; however, both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified five VOCs as groundwater VI COCs and one other VOC was identified as an inhalation of vapors from soil COC. Three of the VOCs dropped out as groundwater COCs for the CTE evaluation.

The future construction worker RME cumulative HI of 16 drops to 7 for the CTE cumulative HI; however, both results remain above the EPA cumulative target HI of 1. The RME evaluation identified VOCs and metals as groundwater and soil COCs. However, four VOCs and mercury drop out as COCs for the CTE evaluation.

The future child resident RME cumulative HI of 75 drops to 42 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified the following COCs in soil and/or groundwater (**Table 6-4**): metals; SVOCs; (2,3,7,8-TCDD TEQ; and VOCs. However, one SVOC, three VOCs, three metals, and 2,3,7,8-TCDD TEQ drop out as COCs for the CTE evaluation.

The future adult resident RME cumulative HI of 57 drops to 43 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified similar COCs as the child resident (**Table 6-4**). However, one SVOC, one VOC, and one metal drop out as groundwater COCs for the CTE evaluation. Additionally, iron (metal), which was identified as a soil and groundwater COC in the RME evaluation, was not identified as a COC for either medium in the CTE evaluation. Even though the future child resident tends to be the more sensitive non-cancer receptor for the residential scenario, the inhalation of indoor air via VI and showering exposure pathways are contributing to the higher future adult resident RME and CTE cumulative HI results. The future child resident is not evaluated for the showering exposure pathway. As shown in **Table 6-4**, benzene and xylenes (VOCs) have high chemical-specific hazard quotients for the future adult resident inhalation indoor air (VI and showering) exposure pathways.

The lead evaluation using EPA's Integrated Exposure Uptake Biokinetic (IEUBK) and Adult Lead Methodology (ALM) models identified lead as a COC for surface soil and total soil for the southern portion of the Central/Southern exposure area. The future outdoor maintenance worker, teen trespasser, construction worker results were above the 5% probability percent

threshold for total soil indicating these receptors have greater than 5% chance of having PbB levels over 5 µg/dL. The future child resident results were also above the 5% probability thresholds for surface and total soil. Therefore, potential soil cleanup options need to be explored to prevent potential adverse effects to human health from exposure to lead in soil.

### 6.4.2 Northern/Western Exposure Area

**Northern/Western Exposure Area Cancer Risk Results**:

As shown in **Table 6-3**, the Northern/Western exposure area RME carcinogenic COCs for lifetime resident are primarily metals, one SVOC, VOCs, and 2,3,7,8-TCDD TEQ. These results assume that the Northern/Western groundwater is used for potable purposes even though the surficial aquifer is not used as an on-site water supply. An Environmental Covenant is not in place to prohibit future potable use of the on-site groundwater.

For the future indoor/outdoor commercial worker scenario, the RME evaluation identified VOCs as groundwater VI COCs. Also, total chromium (metal) was identified as a direct contact with total soil COC. The cumulative RME ELCR results drop from 4E-04 to below the EPA cumulative target ELCR of 1E-04 in the CTE evaluation (i.e., no soil or groundwater COCs).

For the future lifetime resident scenario, the RME evaluation identified one SVOC; 2,3,7,8-TCDD TEQ; and VOCs as groundwater COCs. Arsenic and chromium (metals) were both identified as total soil and groundwater COCs in the RME evaluation. The cumulative RME ELCR results drop from 3E-03 to a CTE ELCR of 2E-03 which is still above the EPA cumulative target ELCR of 1E-04. The CTE evaluation identified the same carcinogenic COCs as the RME evaluation; however, arsenic was dropped as a total soil COC and only identified as a groundwater COC in the CTE evaluation.

**Northern/Western Exposure Area Non-Cancer Hazard Results**:

As shown in **Table 6-4**, the Northern/Western exposure area RME noncarcinogenic COCs for the indoor/outdoor commercial worker, construction worker, and child and adult resident are metals; SVOCs; VOCs; and 2,3,7,8-TCDD TEQ.

The future indoor/outdoor commercial worker RME cumulative HI of 7 drops to 4 for the CTE cumulative HI; however, both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified five VOCs as groundwater VI COCs. However, three VOCs drop out as groundwater COCs for the CTE evaluation.

The future construction worker RME cumulative HI of 11 drops to 6 for the CTE cumulative HI; however, both results remain above the EPA cumulative target HI of 1. The RME evaluation identified the mercury and five VOCs as groundwater inhalation COCs. However, three VOCs and mercury drop out as groundwater COCs for the CTE evaluation.

The future child resident RME cumulative HI of 54 drops to 38 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified the following groundwater COCs (**Table 6-4**): metals; SVOCs; 2,3,7,8-TCDD TEQ; and VOCs. However, four metals, one SVOC, two VOCs, and 2,3,7,8-TCDD TEQ drop out as groundwater COCs for the CTE evaluation.

The future adult resident RME cumulative HI of 45 drops to 42 for the CTE cumulative HI; both sets of results remain above the EPA cumulative target HI of 1. The RME evaluation identified similar COCs as the future child resident (**Table 6-4**). However, two SVOCs and one VOC drop out as groundwater COCs for the CTE evaluation. Even though the child resident tends to be the more sensitive non-cancer receptor for the residential scenario, the inhalation of indoor air

via VI and showering exposure pathways are contributing to the higher adult resident cumulative HI results. The future child resident is not evaluated for the showering exposure pathway. As shown in **Table 6-4**, benzene and xylenes (VOCs) have high chemical-specific hazard quotients for the future adult resident inhalation indoor air (VI and showering) exposure pathways.

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# 7. Uncertainty Analysis

Uncertainties are inherent in every aspect of a quantitative risk assessment. Certain assumptions are made as part of the risk assessment process, and these assumptions may lead to an over- or underestimation of the actual risks associated with the site. The assumptions made for this HHRA were conservative so that an overestimation of the actual risks posed by site conditions is more likely.

This section provides a brief summary of the key uncertainties in this assessment and qualifies the level of effect that each uncertainty has on the assessment. Almost all major assumptions used in the assessment of risk for this site are anticipated to overestimate the actual risks posed by site conditions.

## 7.1 Site Characterization Uncertainties

**Source of Uncertainty**: Biased sampling; collecting soils, groundwater, surface water, and sediment samples at locations where concentrations are likely to be highest.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: Moderate.

**Rationale for Assumptions**: Samples were not collected on a random sample grid pattern; therefore, the UCLs of the mean concentration for COPC are likely biased high, since samples were collected in potential release location(s) rather than being representative of potential exposure across the entire site.

**Source of Uncertainty**: Flagged results such as “J” flags (i.e., estimated values) were carried forward into the HHRA.

**Effect on Risk/Hazard Estimates**: Under- or overestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: EPA (EPA, 1989) guidance recommends treating “J”-flagged results as detected concentrations. The statistical calculations of EPCs takes into account detect and ND results to derive representative concentrations. A “J”-flagged result indicates that the analyte was positively identified, and the associated numerical value is an estimated quantity with an unknown bias. In other words, the “J”-flagged result was treated as a detected concentration even though the chemical’s true concentration was unknown (EPA, 1989). Therefore, if the J-flagged chemical were identified as a COPC, it is unknown if the estimated risk were under- or overestimated because the bias in calculating the EPC using J-flagged results is unknown.

**Source of Uncertainty**: For the identification of COPCs, there are uncertainties associated with selection of sampling locations and procedures and the number of samples collected. Maximum concentrations of chemicals detected in site media were compared with screening criteria that are protective of human health.

**Effect on Risk/Hazard Estimates**: Over- or underestimate.

**Potential Magnitude**: Moderate.

**Rationale for Assumptions**: EPA (EPA, 1989, 2021a) guidance recommends using conservative generic screening levels and maximum detected

concentrations for COPC screening. Also, conservative risk levels were selected for laboratory analysis to be protective of risk-based screening levels where possible; the laboratory was better able to detect potential concentrations of chemicals that may be COPC at the site.

**Source of Uncertainty**: Inclusion of inorganic chemicals that might not be entirely related to the site.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: Metals occur naturally in soils, groundwater, surface water, and sediment; background data are available for soil and groundwater, so a quantitative background comparison was performed for those media which reduces the risk of overestimating.

**Source of Uncertainty**: Both total and dissolved groundwater samples were included in the risk assessment.

**Effect on Risk/Hazard Estimates**: Underestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: Total and dissolved metals results were both used to assess metals at the site. Because the dissolved metals results were field filtered concentrations of metals may be lower than those present in the total metals samples, therefore the combined metals results could be biased low.

**Source of Uncertainty**: Total chromium was treated as hexavalent chromium.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: High.

**Rationale for Assumptions**: Total chromium concentrations were conservatively treated as hexavalent chromium because chromium speciation data were not available. Without speciated chromium data, it was assumed that only hexavalent chromium was present at the Site, which is the more toxic form to human receptors. Hexavalent and trivalent chromium are commonly present at a ratio of 1:6 (Cr IV to Cr III) in the environment (EPA, 2021a); therefore, the total chromium concentrations at the site are likely a similar ratio. This assumption likely overestimates the risk.

**Source of Uncertainty:** If the analytical methods used do not apply to some chemicals that are present at the site, risk could be underestimated.

**Effect on Risk/Hazard Estimates**: Underestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: Since the analytical methods at the site were selected to address all chemicals that are known or suspected to be present on the basis of the history of the site, the potential for not identifying a COPC is reduced.

**Source of Uncertainty:** Identify whether RLs are low enough (i.e., below risk-based screening levels) to capture detected concentrations in the affected media. A detection

limit analysis was included in the screening tables (see **Tables A2-1** through **A2-13** in **Attachment 2**).

**Effect on Risk/Hazard Estimates**: Underestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: Per VDEQ guidance, risk from analytes with MDLs above screening values must be addressed. Analytes that were not detected were screened using the one half the maximum MDL. Those ND analytes that exceeded screening values were included in a data sensitivity analysis using one half the MDL as the EPC. The data sensitivity analysis is discussed further in **Section 7.5**.

**Source of Uncertainty**: A surrogate screening level was used if a screening level were not available for a particular chemical.

**Effect on Risk Hazard Estimates:** Over- or underestimate.

**Magnitude:** Low

**Rationale:** The footnotes of **Table A2-1** through **Table A2-13** in **Attachment 2** document what surrogates were used in the risk-based screening. Where possible, the chemicals selected as surrogates had similar molecular structure and/or toxicity information available. Since peer-reviewed toxicity data are not available, the effect upon the cancer risk and/or non-cancer hazard results for these chemicals is unknown.

## 7.2 Exposure Assessment Uncertainties

**Source of Uncertainty**: A duplicate sample is treated as a sample result and is carried forward into the HHRA.

**Effect on Risk/Hazard Estimates**: Under- or overestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: Duplicate samples were not biased and collected randomly during both the RI and SFI. Any effects from retaining duplicates, was expected to be minimal given the random approach for selecting duplicate locations (equal chance to under or overestimate risk). Duplicates were carried forward to provide higher sample populations for sites and media with less data. Effect on UCL calculations would be negligible for larger sample populations.

**Source of Uncertainty**: Data from groundwater were used to represent the hypothetical future indoor/outdoor commercial worker and hypothetical resident exposure to vapor intrusion emanating from groundwater.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: High.

**Rationale for Assumptions**: The vapor intrusion evaluation assumed that a building is constructed directly above the locations with the highest concentrations of VI COPCs. As these concentrations are found at different locations on the Site, any future building would not be built directly above all these locations, and subsequently the calculated indoor air concentrations are subsequently overestimated. Because of this assumption, cancer risk and non-cancer hazard

results for the future indoor/outdoor commercial worker and hypothetical resident are likely overestimated.

**Source of Uncertainty**: The EPA (EPA, 1989) recommends using the lower of the UCL of the mean concentration and the maximum detected concentration as the EPC. If the calculated UCL were used as the EPC, then the risk results would be less likely to be biased high. If the maximum detected concentration were used as the EPC, then the risk results would be likely biased high.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: Low-Moderate, EPC-dependent.

**Rationale for Assumptions**: UCLs were calculated, when possible, for all media and used in the risk/hazard calculations. Some chemicals required using the maximum detected concentration as the EPC (see **Table 4-1**) due to a small data set or low detection frequency. The cancer risk/non-cancer hazards for COPC and exposure media where maximum detected concentrations were used as EPCs may be overestimated.

**Source of Uncertainty**: Because concentrations of chemicals in media may decrease over time as chemicals migrate and/or degrade, risk estimates for the current scenarios do not necessarily represent future risk.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: Moderate.

**Rationale for Assumptions**: For many organic COPCs, recently measured concentrations represent the worst case for future exposure scenarios. Over time, estimated risks and hazards can be expected to decline.

**Source of Uncertainty**: Modeled concentrations were used to estimate concentrations in the outdoor and indoor air. Generally, a higher level of uncertainty is associated with the use of modeled concentrations rather than the use of measured concentrations.

**Effect on Risk/Hazard Estimates**: Under- or overestimate.

**Potential Magnitude**: Low.

**Rationale for Assumptions**: Conservative model assumptions used to derive the soil-to-air particulate emission factor (PEF), soil-to-air VFs, VFw,amb, groundwater-to-air (VFw,trench and VFw,amb), and vapor migration from groundwater (VISL) tend to reduce the likelihood of underestimating the cancer risk/hazards.

**Source of Uncertainty**: Conservative exposure parameters were used to estimate exposure to the potential human receptors. The default exposure factors that are incorporated for the various exposure scenarios are typically much higher than are realized in practice.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: Moderate.

**Rationale for Assumptions**: Conservative VDEQ (VDEQ, 2020) and EPA (EPA, 2014) default exposure parameters were used to estimate exposure to human receptors. The exposure parameters are documented in **Attachment 3 Tables A3-**

**1** through **A3-11**. When default parameters were not available, site knowledge, best professional judgment, and EPA (EPA, 2011) data were used to derive representative exposure parameters (**Attachment 3 Tables A3-1** through **A3-11**).

## 7.3 Toxicity Assessment Uncertainties

**Source of Uncertainty:** RfDs are frequently derived from animal studies that have little quantitative bearing on potential adverse health effects in humans.

**Effect on Risk/Hazard Estimates:** Overestimate.

**Potential Magnitude:** Moderate.

**Rationale for Assumptions:** Since the fate and mechanism of action of a chemical may differ in animals and humans, the effects observed in animals may not be observed in humans, resulting in an overestimation of potential adverse health effects.

**Source of Uncertainty**: Total chromium used hexavalent chromium toxicity data.

**Effect on Risk/Hazard Estimates**: Overestimate.

**Potential Magnitude**: High.

**Rationale for Assumptions**: Chromium is a polyvalent element and can exist in several distinct oxidation states, but only trivalent chromium and hexavalent chromium occur with any frequency in the natural environment. Hexavalent and trivalent chromium are commonly present at a ratio of 1:6 (Cr IV to Cr III) in the environment (EPA, 2021a). Total chromium was conservatively treated as hexavalent chromium in the risk calculations; therefore, hexavalent chromium toxicity data were used. Hexavalent chromium is the more toxic form to human receptors. This assumption likely overestimates the risk.

**Source of Uncertainty:** Fourth tier toxicity data (e.g., ATSDR, Cal EPA, and HEAST toxicity values) were used to estimate the cancer risk and/or non-cancer hazards for some COPCs (see **Tables A5-1, A5-2, A6-1, and A6-2** of **Attachment 5**).

**Effect on Risk/Hazard Estimates:** Under- or overestimate.

**Potential Magnitude:** Unknown.

**Rationale for Assumptions:** Third tier toxicity values are likely undergoing intensive scientific review and have not been verified by IRIS (EPA, 2021c). It is unknown if the cumulative cancer risk and/or non-cancer hazards are under- or overestimated.

## 7.4 Risk Characterization Uncertainties

**Source of Uncertainty:** Risk characterization uncertainties include possible synergistic or antagonistic effects of exposure to multiple chemicals and applicability of cancer risk estimation methodology to less than lifetime exposure durations.

**Effect on Risk/Hazard Estimates:** Under- or overestimate.

**Potential Magnitude:** Low.

**Rationale for Assumptions:** These uncertainties are generic to the risk assessment process and not specific to the site.

## 7.5 Data Sensitivity Analysis

A data sensitivity analysis (DSA) was conducted wherein one half a chemical's maximum MDL was compared to risk-based screening levels (SLs) that were used to identify COPC (See **Section 3.0**). The purpose of this screening was to ensure that the laboratory analytical methods were sensitive enough to detect potential COPC, assuming residential exposure to site media. If the chemical's laboratory MDL were higher than the SL, then the laboratory analysis could not have detected concentrations that are lower than the MDL but higher than the SL. **Tables A2-1** through **A2-13** of **Attachment 2** present the sensitivity analysis results. Tables **A3-23** through **A3-26** of **Attachment 3** present the summary statistics and selected EPCs for each exposure medium used in the DSA evaluations. Per VDEQ guidance (VDEQ, 2020a), the EPC for ND COPCs included in the DSA was one half the MDL.

To determine how much of an effect including ND chemicals would have on risk results, a second set of risk calculations that included only ND COPCs was included in **Attachment 6**. These calculations were identical to the RME calculations included in **Section 6**, except that only ND analytes were included in the calculations. Potential carcinogenic and noncarcinogenic human health risks are calculated and summarized individually for each receptor exposed to COPCs in the affected site media. Estimated risks are combined across COPCs and exposure pathways, as appropriate.

Detailed cancer risk and non-cancer hazard calculation tables for each receptor and a summary of the risks and hazards for the current/future and future only receptors are presented in **Tables 7.1.DSA** through **7.27.DSA** and **Tables 9.1.DSA** through **9.27.DSA** in **Attachment 6**.

Results of the DSA calculations were reviewed to determine if adding these results to the detection only results presented in **Section 6**, would cause the cancer risk and/or non-cancer hazard to exceed the cumulative target cancer risk level of 1E-04 and/or target HI of 1 for any receptor. The effect of the DSA results on the site receptors is discussed below:

- For the current/future outdoor maintenance worker and the current/future outdoor recreator (adult), the DSA risk results would not cause unacceptable risk in all exposure areas.
- For the current/future teen trespasser, the DSA risk results would cause the HI to exceed 1 in all exposure areas. This is caused by ingestion and dermal contact with ND cyanide in surface water.
- The addition of the DSA risk results would not change the overall conclusions for the current/future outdoor recreator (child and lifetime), future indoor/outdoor commercial worker, future construction worker, and future hypothetical resident (child) because the cumulative cancer risk and HI results are already exceeding the EPA target levels as shown in **Tables 6-3 and 6-4**.

For the current/future off-site lifetime resident the DSA risk results are above the EPA cumulative target ELCR of 1E-04 at 4E-04 and above the cumulative target HI of 1 at 68 for the child resident.

Results of the DSA cancer risk and non-cancer hazard calculations indicate that the addition of ND chemicals would not cause the risk results to exceed the cumulative target cancer risk level of 1E-04 or target HI of 1 for any receptor, except for the current/future teen trespasser, that was

not already exceeding. The current/future teen trespasser is unlikely to be exposed to cyanide below the MDL at the site. No detected analytes exceeded screening values in the Town of Chincoteague well TOC-6, however if the ND chemicals were included in the current/future off-site lifetime resident risk results it would result in unacceptable risk.

### 7.5.1 TEQ Sensitivity Analysis

A sensitivity analysis of the dioxin/furan 2,3,7,8-TCDD TEQ calculations was conducted to determine if non-detects are impacting unacceptable risk results. TEQ calculations were completed using 0 for non-detects instead of ½ the MDL. TEQ calculations are presented in table 2-17 and 2-18 of Attachment 2. EPCs were only calculated for areas with unacceptable risk. Surface soil, subsurface soil, and groundwater EPCs assuming NDs are 0 and NDs are ½ the MDL are compared below.

| Area | Media | Units | NDs = 0 | NDs = 1/2 MDL | Type |
|---|---|---|---|---|---|
| C/S and N/W | Surficial Aquifer | µg/L | 1.03E-06 | 2.09E-05 | UCL |
| C/S | Surface Soil | mg/kg | 2.60E-05 | 2.58E-05 | Max |
| C/S | Total Soil | mg/kg | 3.40E-06 | 2.58E-05 | Max |

Tables comparing the cancer risk and hazard quotients for the 2,3,7,8-TCDD TEQ using an ND of ½ the MDL and of 0 are presented in Tables 7-1 and 7-2. The effect of the two sets of 2,3,7,8-TCDD TEQ calculations on the site receptors is discussed below:

- For the Lifetime Outdoor Recreator in the Central/Southern exposure area: the cancer risk for the current scenario stayed the same (3E-06) and the cancer risk for the future scenario decreased from 3E-06 to 4E-07.
- For the future Lifetime Resident in the Central/Southern exposure area: the cancer risk from ingestion and dermal contact with groundwater decreased from 3E-05 to 2E-06, and the cancer risk from incidental ingestion and dermal contact with total soil decreased from 5E-06 to 7E-07.
- For the future Lifetime Resident in the Northern/Western exposure area: the cancer risk from ingestion and dermal contact with groundwater decreased from 3E-05 to 2E-06.
- For the future Child Resident in the Central/Southern exposure area: the non-cancer risk from ingestion and dermal contact with groundwater decreased from 1 to 0.07, and the non-cancer risk from incidental ingestion and dermal contact with total soil decreased from 0.5 to 0.07.
- For the future Child Resident in the Northern/Western exposure area: the non-cancer risk from ingestion and dermal contact with groundwater decreased from 1 to 0.07.

While some 2,3,7,8-TCDD TEQ risk results decreased to below target risk levels, cumulative risk results still exceed the cumulative target cancer risk level of 1E-04 or target HI of 1 for the Lifetime Outdoor Recreator, future Lifetime Resident, and Child Resident in the Central/ Southern exposure area, as well as the future Lifetime Resident and Child Resident in the Northern/Western exposure area.

## 7.6 Background Threshold Value Evaluation

A Background Threshold Values Report (BTVs Report) was prepared for the WFF (Tetra Tech, 2021). The purpose of the BTVs Report was to provide new background threshold values (BTVs) for analytes-of-interest (analytes) in surface/subsurface soils and groundwater. BTVs are incorporated into this Revised HHRA to determine whether the concentrations of COCs at the site are attributed to background/anthropogenic conditions or from site-related activities. COCs at the site in soil and groundwater were compared to the BTVs for the Molena soil series (**Tables A2-1.BTV through A2-8.BTV of Attachment 2**). COCs that were below BTVs are summarized in **Table 7-3**.

For the RME carcinogenic COCs, the results are summarized on **Table 7-4** and COCs below BTVs are highlighted in green. The following COCs are below BTVs for these receptors:

- Lifetime Outdoor Recreator in the Central/Southern exposure area: Arsenic in surface soil.
- Indoor/Outdoor Commercial Worker in the Northern/Western exposure area: Total Chromium in total soil.
- Onsite Lifetime Resident in the Northern/Western exposure area: Arsenic and total chromium in total soil.

# 8. HHRA Conclusions

The HHRA has fulfilled the objective discussed in **Section 1.0**, which was to conduct a Site-specific, quantitative analysis of the Site under current and future land use scenarios and determine the degree to which exposure may cause adverse human health effects. The evaluation is based on the nature of the COCs detected in environmental media and on the potential exposure pathways to potential human receptors.

The HHRA results indicate that the receptors evaluated for the Upgradient Drainage and Downgradient/Estuarine exposure areas have cumulative ELCR and HI results below the EPA target levels and are eliminated from further evaluation.

The HHRA results indicate that unacceptable risk is possible for the following exposure areas and human receptors:

- Central/Southern exposure area – Future outdoor worker, current/future outdoor recreator (adult/child) exposure to surface and total soil; indoor/outdoor commercial worker exposure to total soil and indoor vapors (VI) from surficial groundwater; future construction worker exposure to total soil, and outdoor vapors (trench) from surficial groundwater; and future hypothetical resident (child/adult) exposure to total soil and surficial groundwater (potable use, VI, and showering/bathing).
    - Lead modeling results for the southern portion the Central/Southern exposure area indicate that the future outdoor maintenance worker, teen trespasser, and construction worker results were above the 5% probability percent threshold for total soil indicating these receptors have above a 5% chance of having PbB levels over 5 µg/dL. The hypothetical child resident results were also above the 5% probability thresholds for surface and total soil. Adverse health effects from exposure to lead in soil are possible.
    - Adverse health effects could be possible from exposure to the following soil and groundwater COCs at the Central/Southern exposure area:

| Soil | Groundwater |
|---|---|
| **VOCs** | **VOCs** |
| 1,1,2-Trichloroethane | 1,2-Dichloroethane |
| 2-Hexanone | Benzene |
| **SVOCs** | cis-1,2-Dichloroethene |
| Benzo(a)anthracene | Cyclohexane |
| Benzo(a)pyrene | Ethylbenzene |
| Benzo(b)fluoranthene | Isopropylbenzene |
| Dibenz(a,h)anthracene | Naphthalene |
| Indeno(1,2,3-cd)pyrene | Tetrachloroethene |
| **Dioxins and Furans** | Toluene |
| 2,3,7,8-TCDD TEQ | Trichloroethene |
| **Metals** | Xylenes, Total |
| Aluminum | **SVOCs** |
| Arsenic | 1,1'-Biphenyl |
| Cadmium (Diet) | 2-Methylnaphthalene |

| Soil | Groundwater |
|---|---|
| Chromium, Total | Benzo(a)pyrene |
| Cobalt | **Dioxins and Furans** |
| Copper | 2,3,7,8-TCDD TEQ |
| Iron | **Metals** |
| Lead | Aluminum |
| Manganese | Arsenic |
| Thallium | Beryllium |
| Vanadium | Chromium, Total |
| | Cobalt |
| | Iron |
| | Manganese |
| | Mercury |
| | Thallium |
| | Vanadium |

- Northern/Western exposure area – Future indoor/outdoor commercial worker exposure to indoor vapors (VI) from surficial groundwater; future construction worker exposure to outdoor vapors (trench) from surficial groundwater; future hypothetical resident (child/adult) exposure to surficial groundwater (potable use, VI, and showering/bathing)
    - Adverse health effects could be possible from exposure to the following groundwater COCs at the Northern/Western exposure area:

| Groundwater | | |
|---|---|---|
| **VOCs** | **SVOCs** | **Metals** |
| 1,2-Dichloroethane | 1,1'-Biphenyl | Aluminum |
| Benzene | 2-Methylnaphthalene | Arsenic |
| cis-1,2-Dichloroethene | Benzo(a)pyrene | Beryllium |
| Cyclohexane | **Dioxins and Furans** | Chromium, Total |
| Ethylbenzene | 2,3,7,8-TCDD TEQ | Cobalt |
| Isopropylbenzene | | Iron |
| Naphthalene | | Manganese |
| Tetrachloroethene | | Mercury |
| Toluene | | Thallium |
| Trichloroethene | | Vanadium |
| Xylenes, Total | | |

Results of the DSA cancer risk and non-cancer hazard calculations indicate that the addition of ND chemicals would not cause the risk results to exceed the cumulative target cancer risk level of 1E-04 or target HI of 1 for any receptor, except for the current/future teen trespasser, that was not already exceeding. No detected analytes in the off-site groundwater exceeded screening values in the Town of Chincoteague well TOC-6, however if the ND chemicals were included in the current/future off-site lifetime resident risk results it would result in unacceptable risk. The

MDLs of the off-site groundwater may not have been protective enough to identify all chemicals of potential concern; therefore, the off-site groundwater results may be underestimated.

Results of the BTV evaluation were incorporated in this Revised HHRA and indicate that the following COCs would be eliminated from future removal action due to being below BTVs for the following receptors:

- Lifetime Outdoor Recreator in the Central/Southern exposure area: Arsenic in surface soil.
- Indoor/Outdoor Commercial Worker in the Northern/Western exposure area: Total Chromium in total soil.
- Onsite Lifetime Resident in the Northern/Western exposure area: Arsenic and total chromium in total soil.

The Revised HHRA conservatively assumed that total chromium concentrations were hexavalent chromium because chromium speciation data were not available. Hexavalent chromium is the more toxic form of chromium to human receptors. Chromium is a polyvalent element and can exist in several distinct oxidation states, but only trivalent chromium and hexavalent chromium occur with any frequency in the natural environment. Chromium cancer risk results may be overestimated.

# 9. References

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# Figures

N

**Legend**

CDL Boundary

# Site Location

0 0.25 0.5 1 Miles

Project 15 CDL FS
WFF FUDS

**Figure 1-1**

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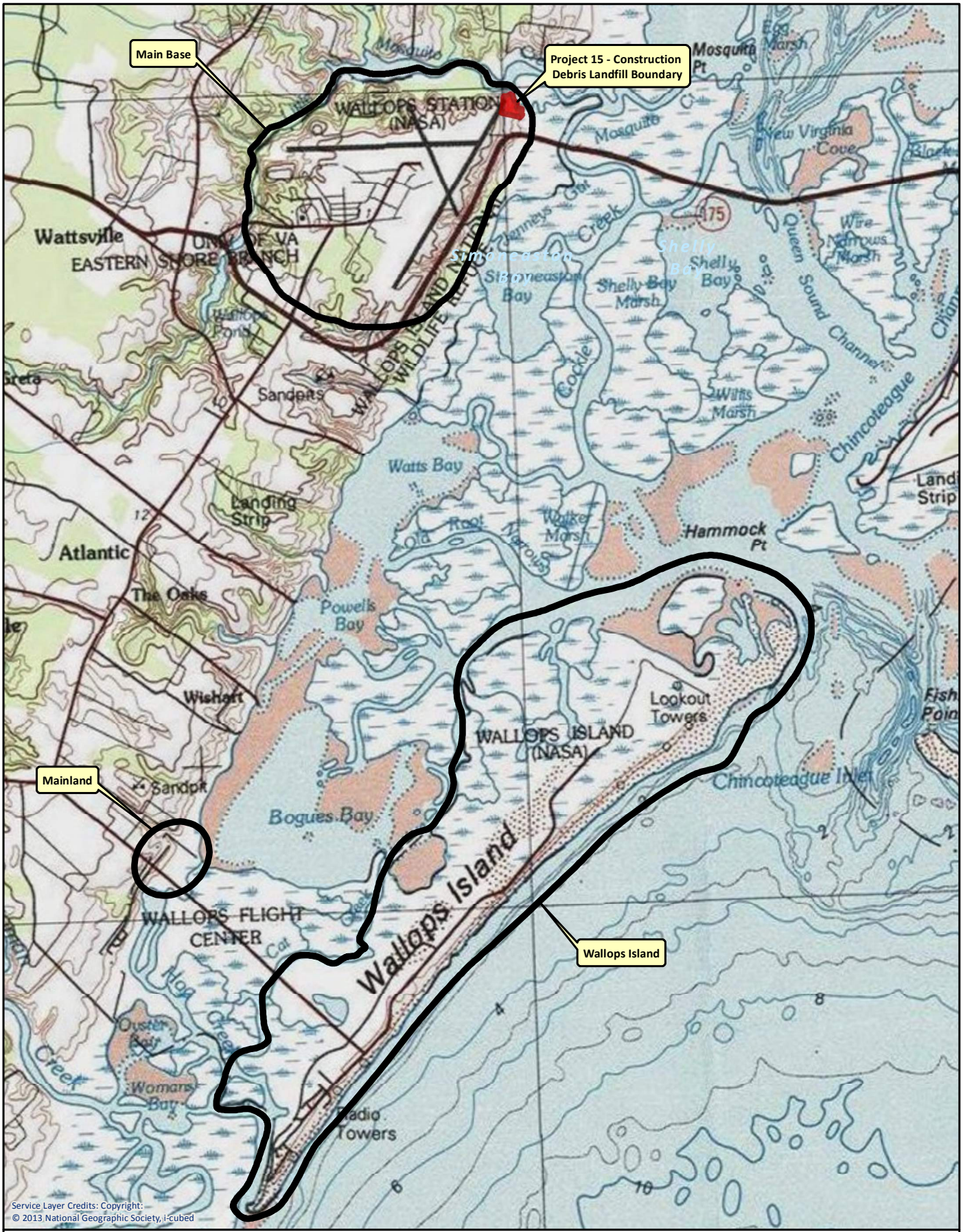



N

**Legend**

CDL Boundary

0 0.5 1 2 Miles

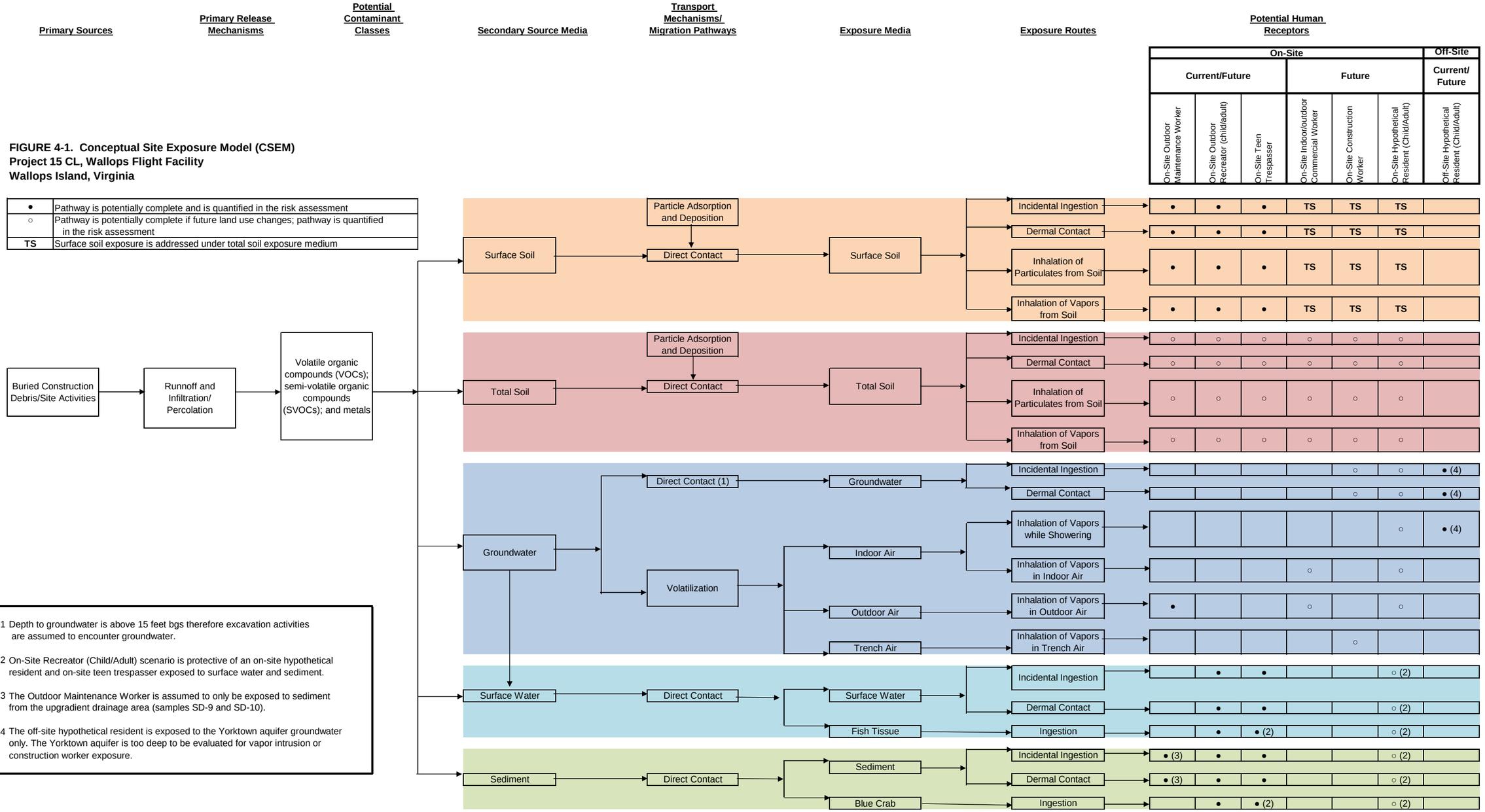
# Site Layout

Project 15 CDL FS
WFF FUDS

**Figure 1-2**

**FIGURE 4-1. Conceptual Site Exposure Model (CSEM)**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| | |
|---|---|
| ● | Pathway is potentially complete and is quantified in the risk assessment |
| ○ | Pathway is potentially complete if future land use changes; pathway is quantified in the risk assessment |
| **TS** | Surface soil exposure is addressed under total soil exposure medium |




**Notes:**

1 Depth to groundwater is above 15 feet bgs therefore excavation activities are assumed to encounter groundwater.

2 On-Site Recreator (Child/Adult) scenario is protective of an on-site hypothetical resident and on-site teen trespasser exposed to surface water and sediment.

3 The Outdoor Maintenance Worker is assumed to only be exposed to sediment from the upgradient drainage area (samples SD-9 and SD-10).

4 The off-site hypothetical resident is exposed to the Yorktown aquifer groundwater only. The Yorktown aquifer is too deep to be evaluated for vapor intrusion or construction worker exposure.

# Tables

**Table ES-1**
**Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Central/Southern (C/S) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, C/S** | | | | |
| Soil | 7E-05 | 0.5 | 4E-05 | **3** |
| Groundwater | 6E-09 | 0.0001 | 6E-09 | 0.0001 |
| **Cumulative Total** | 7E-05 | 0.5 | 4E-05 | **3** |
| **Teen Trespasser, C/S - Soil Only** | 8E-06 | 0.3 | 5E-06 | 0.6 |
| **Child Outdoor Recreator, C/S - Soil Only** | NA | **4** | NA | **7** |
| **Adult Outdoor Recreator, C/S - Soil Only** | NA | 0.3 | NA | 1 |
| **Lifetime Outdoor Recreator, C/S - Soil Only** | **6E-04** | NA | **3E-04** | NA |
| **Indoor/Outdoor Commercial Worker, C/S** | | | | |
| Soil | NA | NA | 4E-05 | **4** |
| Groundwater | NA | NA | **4E-04** | **7** |
| **Cumulative Total** | NA | NA | **4E-04** | **11** |
| **Construction Worker, C/S** | | | | |
| Soil | NA | NA | 6E-06 | **5** |
| Groundwater | NA | NA | 4E-05 | **11** |
| **Cumulative Total** | NA | NA | 4E-05 | **16** |
| **Child Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **22** |
| Groundwater | NA | NA | **--** | **53** |
| **Cumulative Total** | NA | NA | -- | **75** |
| **Adult Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **13** |
| Groundwater | NA | NA | **--** | **45** |
| **Cumulative Total** | NA | NA | -- | **57** |
| **Lifetime Resident, C/S** | | | | |
| Soil | NA | NA | **6E-04** | -- |
| Groundwater | NA | NA | **3E-03** | -- |
| **Cumulative Total** | NA | NA | **3E-03** | -- |
| **Northern/Western (N/W) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, N/W** | | | | |
| Soil | 5E-06 | 0.05 | 5E-06 | 0.05 |
| Groundwater | 6E-09 | 0.0001 | 6E-09 | 0.0001 |
| **Cumulative Total** | 5E-06 | 0.05 | 5E-06 | 0.05 |
| **Teen Trespasser, N/W - Soil Only** | 6E-07 | 0.02 | 6E-07 | 0.02 |
| **Child Outdoor Recreator, N/W - Soil Only** | -- | 0.4 | NA | 0.4 |
| **Adult Outdoor Recreator, N/W - Soil Only** | -- | 0.04 | NA | 0.04 |

# Table ES-1
## Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Lifetime Outdoor Recreator, N/W - Soil Only** | 4E-05 | -- | 4E-05 | NA |
| **Indoor/Outdoor Commercial Worker, N/W** | | | | |
| Soil | NA | NA | 5E-06 | 0.06 |
| Groundwater | NA | NA | **4E-04** | **7** |
| **Cumulative Total** | NA | NA | **4E-04** | **7** |
| **Construction Worker, N/W** | | | | |
| Soil | NA | NA | 6E-07 | 0.2 |
| Groundwater | NA | NA | 4E-05 | **11** |
| **Cumulative Total** | NA | NA | 4E-05 | **11** |
| **Child Resident, N/W** | | | | |
| Soil | NA | NA | **--** | **0.8** |
| Groundwater | NA | NA | **--** | **53** |
| **Cumulative Total** | NA | NA | -- | **54** |
| **Adult Resident, N/W** | | | | |
| Soil | NA | NA | **--** | **0.08** |
| Groundwater | NA | NA | **--** | **45** |
| **Cumulative Total** | NA | NA | -- | **45** |
| **Lifetime Resident, N/W** | | | | |
| Soil | NA | NA | **7E-05** | -- |
| Groundwater | NA | NA | **3E-03** | -- |
| **Cumulative Total** | NA | NA | **3E-03** | -- |
| **Upgradient Drainage Exposure Area - Surface Water and Sediment** | | | | |
| Outdoor Worker, U/D | 1E-05 | 0.04 | NA | NA |
| Teen Trespasser, U/D | 2E-06 | 0.003 | NA | NA |
| Child Outdoor Recreator, U/D | -- | 0.2 | NA | NA |
| Adult Outdoor Recreator, U/D | -- | 0.02 | NA | NA |
| Lifetime Outdoor Recreator, U/D | 5E-05 | -- | NA | NA |
| **Downgradient/Estuarine Exposure Area - Surface Water and Sediment** | | | | |
| Teen Trespasser, D/E | 4E-06 | 0.01 | NA | NA |
| Child Outdoor Recreator, D/E | -- | 0.4 | NA | NA |
| Adult Outdoor Recreator, D/E | -- | 0.06 | NA | NA |
| Lifetime Outdoor Recreator, D/E | 7E-05 | -- | NA | NA |

**Notes:**

-- = COPCs do not exhibit toxicological health effects to calculate either cancer risks or hazards for this pathway.

COPC = chemical of potential concern; C/S = Central/Southern; D/E = Downgradient/Estuarine;

NA = Not Applicable; N/W = Northern/Western; UD = Upgradient Drainage

## Table ES-1
## Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |

*Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

** Risk-based screen results did not identify any detected groundwater COPCs in the deeper Yorktown Aquifer; offsite residential exposure to groundwater was not evaluated.

**EPA Target Thresholds (Exceedances are Shaded):**

- Target Cumulative Cancer Risk Threshold of 1×10-4 (1E-04).
- Target Non-Cancer Hazard Threshold, or Hazard Index (HI), of 1.

**Table ES-2**
**Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Central/Southern (C/S) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, C/S** | | | | |
| Soil | 6E-06 | 0.2 | 4E-06 | **3** |
| Groundwater | 1E-09 | 0.0001 | 1E-09 | 0.0001 |
| **Cumulative Total** | 6E-06 | 0.2 | 4E-06 | **3** |
| **Teen Trespasser, C/S - Soil Only** | 2E-06 | 0.3 | 2E-06 | 0.5 |
| **Child Outdoor Recreator, C/S - Soil Only** | NA | 0.5 | NA | 0.9 |
| **Adult Outdoor Recreator, C/S - Soil Only** | NA | 0.04 | NA | 0.3 |
| **Lifetime Outdoor Recreator, C/S - Soil Only** | **1E-04** | NA | 7E-05 | NA |
| **Indoor/Outdoor Commercial Worker, C/S** | | | | |
| Soil | NA | NA | 4E-06 | **2** |
| Groundwater | NA | NA | 5E-05 | **4** |
| **Cumulative Total** | NA | NA | 6E-05 | **5** |
| **Construction Worker, C/S** | | | | |
| Soil | NA | NA | 6E-07 | **2** |
| Groundwater | NA | NA | 9E-06 | **6** |
| **Cumulative Total** | NA | NA | 1E-05 | **7** |
| **Child Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **4** |
| Groundwater | NA | NA | **--** | **38** |
| **Cumulative Total** | NA | NA | -- | **42** |
| **Adult Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **1** |
| Groundwater | NA | NA | **--** | **42** |
| **Cumulative Total** | NA | NA | -- | **43** |
| **Lifetime Resident, C/S** | | | | |
| Soil | NA | NA | **2E-04** | -- |
| Groundwater | NA | NA | **2E-03** | -- |
| **Cumulative Total** | NA | NA | **2E-03** | -- |
| **Northern/Western (N/W) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, N/W** | | | | |
| Soil | 5E-07 | 0.02 | 5E-07 | 0.02 |
| Groundwater | 1E-09 | 0.0001 | 1E-09 | 0.0001 |
| **Cumulative Total** | 5E-07 | 0.02 | 5E-07 | 0.02 |
| **Teen Trespasser, N/W - Soil Only** | 3E-07 | 0.02 | 2E-07 | 0.02 |
| **Child Outdoor Recreator, N/W - Soil Only** | NA | 0.05 | NA | 0.05 |
| **Adult Outdoor Recreator, N/W - Soil Only** | NA | 0.004 | NA | 0.004 |
| **Lifetime Outdoor Recreator, N/W - Soil Only** | 7E-06 | NA | 7E-06 | NA |
| **Indoor/Outdoor Commercial Worker, N/W** | | | | |
| Soil | NA | NA | 4E-07 | 0.03 |

## Table ES-2
## Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| Groundwater | NA | NA | 5E-05 | **4** |
| **Cumulative Total** | NA | NA | 5E-05 | **4** |
| **Construction Worker, N/W** | | | | |
| Soil | NA | NA | 6E-08 | 0.04 |
| Groundwater | NA | NA | 9E-06 | **6** |
| **Cumulative Total** | NA | NA | 9E-06 | **6** |
| **Child Resident, N/W** | | | | |
| Soil | NA | NA | **--** | 0.2 |
| Groundwater | NA | NA | **--** | **38** |
| **Cumulative Total** | NA | NA | -- | **38** |
| **Adult Resident, N/W** | | | | |
| Soil | NA | NA | **--** | 0.02 |
| Groundwater | NA | NA | **--** | **42** |
| **Cumulative Total** | NA | NA | -- | **42** |
| **Lifetime Resident, N/W** | | | | |
| Soil | NA | NA | 2E-05 | -- |
| Groundwater | NA | NA | **2E-03** | -- |
| **Cumulative Total** | NA | NA | **2E-03** | -- |
| **Upgradient Drainage Exposure Area** | | | | |
| Outdoor Worker, U/D | 1E-06 | 0.02 | NA | NA |
| Teen Trespasser, U/D | 6E-07 | 0.002 | NA | NA |
| Child Outdoor Recreator, U/D | -- | 0.02 | NA | NA |
| Adult Outdoor Recreator, U/D | -- | 0.002 | NA | NA |
| Lifetime Outdoor Recreator, U/D | 8E-06 | -- | NA | NA |
| **Downgradient/Estuarine Exposure Area** | | | | |
| Teen Trespasser, D/E | 1E-06 | 0.005 | NA | NA |
| Child Outdoor Recreator, D/E | -- | 0.06 | NA | NA |
| Adult Outdoor Recreator, D/E | -- | 0.008 | NA | NA |
| Lifetime Outdoor Recreator, D/E | 1E-05 | -- | NA | NA |

**Notes:**

-- = COPCs do not exhibit toxicological health effects to calculate either cancer risks or hazards for this pathway.

COPC = chemical of potential concern; C/S = Central/Southern; D/E = Downgradient/Estuarine;

NA = Not Applicable; N/W = Northern/Western; UD = Upgradient Drainage

*Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

** Risk-based screen results did not identify any detected groundwater COPCs in the deeper Yorktown Aquifer; offsite residential exposure to groundwater was not evaluated.

**EPA Target Thresholds (Exceedances are Shaded):**

**Table ES-2**
**Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |

- Target Cumulative Cancer Risk Threshold of 1×10-4 (1E-04).
- Target Non-Cancer Hazard Threshold, or Hazard Index (HI), of 1.

**Table ES-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| **Central/Southern Exposure Area** | | | | | | | | | |
| RME | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 6E-04 | Benzo(a)pyrene | SVOC | RME only | 3E-06 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | 2E-06 | NA | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | 3E-06 | NA | |
| | | | | Arsenic | MET | RME only | 4E-06 | NA | |
| | | | | Chromium, total | MET | RME+CTE | 6E-04 | NA | |
| | | | Future: 3E-04 | 1,1,2-Trichloroethane | VOC | RME only | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | RME only | NA | 3E-06 | |
| | | | | Benzo(a)pyrene | SVOC | RME only | NA | 1E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME only | NA | 3E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME only | NA | 2E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 3E-06 | |
| | | | | Arsenic | MET | RME only | NA | 8E-06 | |
| | | | | Chromium, total | MET | RME only | NA | 2E-04 | |
| RME | Future | Indoor/Outdoor Commercial Worker, C/S | Future: 4E-04 | Benzo(a)pyrene | SVOC | RME only | NA | 1E-05 | Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | RME only | NA | 3E-06 | |
| | | | | Chromium, Total | MET | RME only | NA | 2E-05 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 3E-06 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | RME only | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME only | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | RME only | NA | 9E-05 | |
| | | | | Naphthalene | VOC | RME only | NA | 6E-06 | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 8E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 3E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 2E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-03 | |

**Table ES-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [(b)] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | Ethylbenzene | VOC | RME+CTE | NA | 4E-04 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | RME only | NA | 3E-06 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 2E-06 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 2E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME+CTE | NA | 6E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | NA | 3E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME+CTE | NA | 4E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 5E-06 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-05 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| CTE | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 1E-04 | Chromium, Total | MET | RME+CTE | 1E-04 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| CTE | Future | Onsite Lifetime Resident, C/S | Future: 2E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7E-05 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 2E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 3E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 4E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 7E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 2E-06 | |
| | | | | Benzo(a)anthracene | SVOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-05 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME+CTE | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME+CTE | NA | 1E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 1E-06 | |
| | | | | Arsenic | MET | RME+CTE | NA | 3E-06 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 9E-05 | |
| **Northern/Western Exposure Area** | | | | | | | | | |
| RME | Future | Indoor/Outdoor Commercial Worker, N/W | Future: 4E-04 | 1,2-Dichloroethane | VOC | RME only | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (Vapor Intrusion [VI]) |
| | | | | Benzene | VOC | RME only | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | RME only | NA | 9E-05 | |
| | | | | Naphthalene | VOC | RME only | NA | 6E-06 | |
| | | | | Chromium, Total | MET | RME only | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |

**Table ES-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [(b)] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| RME | Future | Onsite Lifetime Resident, N/W | Future: 3E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 8E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 3E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 2E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-03 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 3E-06 | |
| | | | | Arsenic | MET | RME only | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Chromium, Total | MET | RME+CTE | NA | 7E-05 | |
| CTE | Future | Onsite Lifetime Resident, N/W | Future: 2E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 5E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7E-05 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 2E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 3E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 4E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 7E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 2E-06 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 2E-05 | Ingestion and Dermal Contact with Total Soil |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.
(b) All groundwater pathways involve the Surficial Aquifer.

= COC below BTVs

**Table ES-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| **Central/Southern Exposure Area** | | | | | | | | | |
| **RME** | Outdoor Worker, C/S | Future: 3 | Respiratory System (RS) = 3 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Child Outdoor Recreator, C/S | Current/Future: 4 | Gastrointestinal (GI) = 1 | Copper | MET | RME only | 0.5 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Iron | MET | RME only | 0.5 | NA | |
| | | | Other (OT) = 1 | Antimony | MET | RME only | 0.7 | NA | |
| | | | | Nickel | MET | RME only | 0.3 | NA | |
| | | Future: 7 | Gastrointestinal (GI) = 1 | Copper | MET | RME only | NA | 0.5 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME only | NA | 0.6 | |
| | | | Hematological (HM) = 2 | Antimony | MET | RME only | NA | 2 | |
| | | | Other (OT) = 2 | Antimony | MET | RME only | NA | 2 | |
| | | | | Nickel | MET | RME only | NA | 0.3 | |
| **RME** | Indoor/Outdoor Commercial Worker, C/S | Future: 11 | Immune System (IM) = 4 | Benzene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME only | NA | 0.2 | |
| | | | Nervous System (NV) = 4 | Naphthalene | VOC | RME only | NA | 0.2 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 3 | |
| | | | Respiratory System (RS) = 3 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 3 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Construction Worker, C/S | Future: 16 | Hematological (HM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 8 | Manganese | MET | RME only | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Manganese | MET | RME+CTE | NA | 0.2 | Inhalation of Particles in Outdoor Air from Total Soil (Trench) |
| | | | | 2-Hexanone | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Total Soil (Trench) |
| | | | | Isopropylbenzene | VOC | RME+CTE | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Mercury | MET | RME only | NA | 0.1 | |
| | | | Other (OT) = 2 | Xylenes, Total | VOC | RME only | NA | 1 | |
| | | | Respiratory System (RS) = 9 | Isopropylbenzene | VOC | RME only | NA | 0.2 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Onsite Child Resident, C/S | Future: 75 | Cardiovascular System (CV) = 2 | Arsenic | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Dermal (DM) = 9 | Arsenic | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Thallium | MET | RME+CTE | NA | 0.1 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 7 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |

**Table ES-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Child Resident, C/S | Future: 75 | Developmental System (DV) = 3 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Endocrine (EN) = 2 | Isopropylbenzene | VOC | RME only | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Cobalt | MET | RME only | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Cobalt | MET | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Gastrointestinal (GI) = 3 | Beryllium | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Copper | MET | RME+CTE | NA | 0.9 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME+CTE | NA | 1 | |
| | | | | Iron | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Immune System (IM) = 20 | Benzene | VOC | RME+CTE | NA | 4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.1 | |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 18 | 2-Hexanone | VOC | RME only | NA | 0.2 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Aluminum | MET | RME+CTE | NA | 0.2 | |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 2-Hexanone | VOC | RME only | NA | 0.1 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Aluminum | MET | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 2 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Reproductive System (RP) = 2 | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 0.5 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Respiratory System (RS) = 12 | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 11 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | Urinary System = 2 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.3 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.9 | |
| | | | | Cadmium (Diet) | MET | RME only | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |

**Table ES-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Adult Resident, C/S | Future: 57 | Dermal (DM) = 5 | Arsenic | MET | RME+CTE | NA | 0.8 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 4 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Gastrointestinal (GI) = 1 | Iron | MET | RME+CTE | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Beryllium | MET | RME only | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Iron | MET | RME+CTE | NA | 0.6 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 16 | Aluminum | MET | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.01 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 12 | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 11 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Urinary System = 1 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Outdoor Worker, C/S | Future: 3 | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| CTE | Indoor/Outdoor Commercial Worker, C/S | Future: 5 | Respiratory System (RS) = 1 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | Immune System (IM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Nervous System (NV) = 2 | Xylenes, Total | VOC | RME+CTE | NA | 3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Construction Worker, C/S | Future: 7 | Hematological (HM) = 1 | Benzene | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 4 | Manganese | MET | RME+CTE | NA | 0.1 | Inhalation of Particles in Outdoor Air from Total Soil (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Respiratory System (RS) = 5 | Naphthalene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |

**Table ES-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Onsite Adult Resident, C/S | Future: 43 | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.8 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 0.003 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Dermal (DM) = 4 | Arsenic | MET | RME+CTE | NA | 0.6 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 3 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.8 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| CTE | Onsite Child Resident, C/S | Future: 42 | Dermal (DM) = 2 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Benzo(a)pyrene | SVOC | RME+CTE | NA | 0.4 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Gastrointestinal (GI) = 1 | Copper | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME+CTE | NA | 0.3 | |
| | | | | Beryllium | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Iron | MET | RME+CTE | NA | 0.3 | |
| | | | Immune System (IM) = 17 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Manganese | MET | RME+CTE | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |

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**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Onsite Child Resident, C/S | Future: 42 | Nervous System (NV) = 15 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Other (OT) = 1 | Antimony | MET | RME+CTE | NA | 0.9 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Nickel | MET | RME+CTE | NA | 0.1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.2 | |
| **Northern/Western Exposure Area** | | | | | | | | | |
| RME | Indoor/Outdoor Commercial Worker, N/W | Future: 8 | Immune System (IM) = 4 | Benzene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME only | NA | 0.2 | |
| | | | Nervous System (NV) = 3 | Naphthalene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 3 | |
| RME | Construction Worker, N/W | Future: 11 | Hematological (HM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 8 | Isopropylbenzene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Mercury | MET | RME only | NA | 0.1 | |
| | | | Other (OT) = 1 | Xylenes, Total | VOC | RME only | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Respiratory System (RS) = 7 | Isopropylbenzene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| RME | Onsite Child Resident, N/W | Future: 54 | Cardiovascular System (CV) = 1 | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Dermal (DM) = 8 | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 7 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | Developmental System (DV) = 2 | Trichloroethene | VOC | RME+CTE | NA | 0.1 | |
| | | | | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Endocrine (EN) = 1 | Isopropylbenzene | VOC | RME only | NA | 0.1 | |
| | | | | Cobalt | MET | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Gastrointestinal (GI) = 1 | Beryllium | MET | RME only | NA | 0.2 | |
| | | | | Iron | MET | RME only | NA | 1 | |
| | | | Immune System (IM) = 20 | Benzene | VOC | RME+CTE | NA | 4 | |

**Table ES-4**
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**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Child Resident, N/W | Future: 54 | Immune System (IM) = 20 | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 17 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Aluminum | MET | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 2 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Reproductive System (RP) = 1 | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Respiratory System (RS) = 1 | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | Urinary System = 2 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.2 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.3 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.9 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| RME | Onsite Adult Resident, N/W | Future: 45 | Dermal (DM) = 5 | Arsenic | MET | RME+CTE | NA | 0.8 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 4 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 16 | Aluminum | MET | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.01 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 1 | 2-Methylnaphthalene | SVOC | RME only | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Urinary System = 1 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |

**Table ES-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Indoor/Outdoor Commercial Worker, N/W | Future: 4 | Immune System (IM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Nervous System (NV) = 2 | Xylenes, Total | VOC | RME+CTE | NA | 1 | |
| CTE | Construction Worker, N/W | Future: 6 | Hematological (HM) = 1 | Benzene | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 4 | Naphthalene | VOC | RME+CTE | NA | 4 | |
| | | | Respiratory System (RS) = 4 | Naphthalene | VOC | RME+CTE | NA | 4 | |
| CTE | Onsite Child Resident, N/W | Future: 38 | Dermal (DM) = 2 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 17 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 1 | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Onsite Adult Resident, N/W | Future: 42 | Dermal (DM) = 4 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

# Table 3-1
# Selected Screening Criteria for the HHRA
# Human Health Risk Assessment
# Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Selected Screening Criteria | Notes |
|---|---|
| **Soil and Sediment Screening Criteria** | |
| Residential Soil RSLs | Residential Soil RSLs are multiplied by a factor of 10 for sediment. |
| **Groundwater Screening Criteria** | |
| Tapwater RSLs | |
| **Surface Water Screening Criteria** | |
| National Recommended Water Quality Criteria (NRWQC) for Human Health (HH) and Aquatic Life (Federal HH-Water + Organism) | For RCRA Corrective Action, the lower of Federal HH-Water + Organism and VAWQS-HH-PWS was used for the screening value. If neither was available, the Federal MCL was used unless that too was not available in which case the Tapwater RSL multiplied by a factor of 10 was used. |
| Virginia Water Quality Standards Criteria for Surface Water Table - Public Water System (VAWQS-HH-PWS) | |
| USEPA Drinking Water Standards (Federal MCL) | |
| Tapwater RSLs (x10) | |
| **Vapor Intrusion Screening Criteria** | |
| Default Resident Vapor Intrusion Screening Levels (VISL) | |
| **Fish and Crab Tissue Concentration Screening Criteria** | |
| Regional Fish RSLs | Modeled concentrations of crab and fish tissue derived from sediment and surface water concentrations were screened against USEPA Regional Fish RSLs. |

**References:**


USEPA's Regional Screening Levels (RSLs) (May 2021) protective of a target hazard quotient of 0.1 and a target cancer risk of 1E-06.

USEPA's Regional Fish RSLs (Spring 2021) protective of a target hazard quotient of 0.1 and a target cancer risk of 1E-06.

USEPA's Vapor Intrusion Screening Levels (VISL) Calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator. Accessed 9/29/2021.

USEPA, 2018. Drinking Water Standards and Health Advisories. https://www.epa.gov/sites/production/files/2018-03/documents/dwtable2018.pdf

USEPA, 2017. National Recommended Water Quality Criteria (NRWQC) for Human Health (HH) and Aquatic Life.

Virginia Water Quality Standards (VAWQS) Criteria for Surface Water Table - Public Water System (PWS) (9VAC25-260-140). https://lis.virginia.gov/cgi-bin/legp604.exe?000+reg+9VAC25-260-140&000+reg+9VAC25-260-140

**Table 3-2**
**Summary of Site-Related Chemicals of Potential Concern**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Chemical | CASRN | Exposure Medium and Pathways | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Surface Soil Central AOC | Surface Soil Northern AOC | Surface Soil Sourthern AOC | Surface Soil Western AOC | Subsurface Soil Central AOC | Subsurface Soil Northern AOC | Subsurface Soil Sourthern AOC | Sediment Upgradient Drainage | Sediment Downgradient Estaurine | Surface Water Downgradient Estaurine | Groundwater Surficial Aquifer | Groundwater VI Surficial | Groundwater Yorktown Aquifer |
| **Volatile Organic Compounds** | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | X (ND) |
| 1,1,2-Trichloroethane | 79-00-5 | -- | -- | -- | -- | X | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- |
| 1,1-Dichloroethane | 75-34-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| 1,1-Dichloroethene | 75-35-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| 1,2,4-Trichlorobenzene | 120-82-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | -- |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | X (ND) |
| 1,2-Dibromoethane | 106-93-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | X (ND) |
| 1,2-Dichlorobenzene | 95-50-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 1,2-Dichloroethane | 107-06-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X (ND) |
| 1,2-Dichloropropane | 78-87-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| 1,3-Dichlorobenzene | 541-73-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 1,4-Dichlorobenzene | 106-46-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| 2-Butanone (MEK) | 78-93-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Hexanone | 591-78-6 | -- | -- | -- | -- | X | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acetone | 67-64-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzene | 71-43-2 | -- | -- | -- | -- | X | -- | -- | -- | -- | -- | X | X | -- |
| Bromodichloromethane | 75-27-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) |
| Bromoform | 75-25-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Bromomethane | 74-83-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| Carbon disulfide | 75-15-0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon tetrachloride | 56-23-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| Chlorobenzene | 108-90-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Chloroethane | 75-00-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroform | 67-66-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X (ND) | X (ND) |
| Chloromethane | 74-87-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| cis-1,2-Dichloroethene | 156-59-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| Cyclohexane | 110-82-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- |
| Dibromochloromethane | 124-48-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Dichlorodifluoromethane | 75-71-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| Ethylbenzene | 100-41-4 | -- | -- | -- | -- | X | -- | -- | -- | -- | -- | X | X | -- |
| Hexachlorobutadiene | 87-68-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | X (ND) |
| Isopropylbenzene | 98-82-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- |
| m,p-Xylene | 179601-23-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- |
| Methyl Acetate | 79-20-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Methylcyclohexane | 108-87-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- |
| Methylene chloride | 75-09-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Naphthalene | 91-20-3 | -- | -- | -- | -- | X | -- | -- | -- | -- | -- | X | X | -- |
| o-Xylene | 95-47-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- |
| Styrene | 100-42-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- |
| Toluene | 108-88-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | -- |
| trans-1,2-Dichloroethene | 156-60-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| trans-1,3-Dichloropropene | 10061-02-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| Trichloroethene | 79-01-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X (ND) |
| Trichlorofluoromethane | 75-69-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Table 3-2**
**Summary of Site-Related Chemicals of Potential Concern**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Chemical | CASRN | Exposure Medium and Pathways | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Surface Soil Central AOC | Surface Soil Northern AOC | Surface Soil Sourthern AOC | Surface Soil Western AOC | Subsurface Soil Central AOC | Subsurface Soil Northern AOC | Subsurface Soil Sourthern AOC | Sediment Upgradient Drainage | Sediment Downgradient Estaurine | Surface Water Downgradient Estaurine | Groundwater Surficial Aquifer | Groundwater VI Surficial | Groundwater Yorktown Aquifer |
| Vinyl chloride | 75-01-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | X (ND) |
| Xylene (total) | 1330-20-7 | -- | -- | -- | -- | X | -- | -- | -- | -- | -- | X | X | -- |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | X | X (ND) |
| 2,4,5-Trichlorophenol | 95-95-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | 88-06-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 2,4-Dichlorophenol | 120-83-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | 105-67-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 2,4-Dinitrotoluene | 121-14-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | X (ND) |
| 2,6-Dinitrotoluene | 606-20-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | X (ND) |
| 2-Chloronaphthalene | 91-58-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | 95-57-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | 91-57-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- | -- |
| 2-Methylphenol | 95-48-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | 88-74-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | 88-75-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 3&4-Methylphenol | 15831-10-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | 91-94-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | X (ND) |
| 3-Nitroaniline | 99-09-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-o-cresol | 534-52-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | X (ND) |
| 4-Bromophenyl phenyl ether | 101-55-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methyl phenol | 59-50-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | 106-47-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | 100-01-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| 4-Nitrophenol | 100-02-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Acenaphthene | 83-32-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | 208-96-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acetophenone | 98-86-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | 120-12-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Atrazine | 1912-24-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Benzaldehyde | 100-52-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | X | -- | -- | -- | X | -- | -- | -- | -- | X (ND) | X | -- | X (ND) |
| Benzo(a)pyrene | 50-32-8 | X | -- | X | -- | X | -- | X | -- | -- | X (ND) | X | -- | X (ND) |
| Benzo(b)fluoranthene | 205-99-2 | X | -- | -- | -- | X | -- | -- | -- | -- | X (ND) | X | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | 111-44-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | X (ND) |
| bis(2-Chloroisopropyl)ether | 108-60-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | -- |
| Butyl benzyl phthalate | 85-68-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | -- |
| Caprolactam | 105-60-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbazole | 86-74-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | 218-01-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | X | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | X (ND) |
| Dibenzofuran | 132-64-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- | -- |
| Diethyl phthalate | 84-66-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethyl phthalate | 131-11-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butyl phthalate | 84-74-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Table 3-2**
**Summary of Site-Related Chemicals of Potential Concern**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Chemical | CASRN | Exposure Medium and Pathways | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Surface Soil Central AOC | Surface Soil Northern AOC | Surface Soil Sourthern AOC | Surface Soil Western AOC | Subsurface Soil Central AOC | Subsurface Soil Northern AOC | Subsurface Soil Sourthern AOC | Sediment Upgradient Drainage | Sediment Downgradient Estaurine | Surface Water Downgradient Estaurine | Groundwater Surficial Aquifer | Groundwater VI Surficial | Groundwater Yorktown Aquifer |
| Di-n-octyl phthalate | 117-84-0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | 206-44-0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | 86-73-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | 118-74-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | X (ND) |
| Hexachlorocyclopentadiene | 77-47-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) |
| Hexachloroethane | 67-72-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | X (ND) | -- |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | -- | -- | -- | -- | X | -- | -- | -- | -- | X (ND) | X (ND) | -- | -- |
| Isophorone | 78-59-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | 98-95-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | X (ND) |
| N-Nitroso-di-n-propylamine | 621-64-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | X (ND) |
| N-Nitrosodiphenylamine | 86-30-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | 87-86-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | X (ND) |
| Phenanthrene | 85-01-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | 108-95-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | 129-00-0 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Pesticides** | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | -- | -- | X | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| 4,4'-DDE | 72-55-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| 4,4'-DDT | 50-29-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| Aldrin | 309-00-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | -- |
| alpha-BHC | 319-84-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| alpha-Chlordane | 5103-71-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | 319-85-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | 319-86-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | 60-57-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| Endosulfan sulfate | 1031-07-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan-I | 959-98-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan-II | 33213-65-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | 72-20-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | 7421-93-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin ketone | 53494-70-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC (Lindane) | 58-89-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | 5103-74-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | 76-44-8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| Heptachlor epoxide | 1024-57-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| Methoxychlor | 72-43-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | 8001-35-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- | -- |
| **Polychlorinated Biphenyls** | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor 1221 | 11104-28-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Aroclor 1232 | 11141-16-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- |
| Aroclor 1242 | 53469-21-9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Aroclor 1248 | 12672-29-6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Aroclor 1254 | 11097-69-1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| Aroclor 1260 | 11096-82-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | -- | -- |
| **Dioxins and Furans** | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |

**Table 3-2**
**Summary of Site-Related Chemicals of Potential Concern**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Chemical | CASRN | Exposure Medium and Pathways | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Surface Soil Central AOC | Surface Soil Northern AOC | Surface Soil Sourthern AOC | Surface Soil Western AOC | Subsurface Soil Central AOC | Subsurface Soil Northern AOC | Subsurface Soil Sourthern AOC | Sediment Upgradient Drainage | Sediment Downgradient Estaurine | Surface Water Downgradient Estaurine | Groundwater Surficial Aquifer | Groundwater VI Surficial | Groundwater Yorktown Aquifer |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 2,3,4,7,8-PECDF | 57117-31-4 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 2,3,7,8-TCDD | 1746-01-6 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| OCDD | 3268-87-9 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| OCDF | 39001-02-0 | -- | -- | See TEQ | -- | -- | -- | See TEQ | -- | See TEQ | -- | See TEQ | See TEQ | See TEQ |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | -- | -- | X | -- | -- | -- | -- | -- | -- | -- | X | -- | X (ND) |
| **Cyanide** | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | X (ND) | X (ND) | -- | -- |
| **Metals (Total)** | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | X | X | X | X | X | -- | X | -- | -- | -- | X | -- | -- |
| Antimony | 7440-36-0 | -- | -- | X | -- | X | -- | X | -- | -- | X | X | -- | X (ND) |
| Arsenic | 7440-38-2 | X | X | X | X | X | X | X | X | X | X | X | -- | X (ND) |
| Barium | 7440-39-3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- | -- |
| Beryllium | 7440-41-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | X | -- | -- |
| Cadmium | 7440-43-9 | -- | -- | X | -- | -- | -- | X | -- | -- | -- | X | -- | X (ND) |
| Calcium | 7440-70-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chromium | 7440-47-3 | X | X | X | X | X | X | X | X | X | -- | X | -- | X (ND) |
| Cobalt | 7440-48-4 | X | X | X | X | X | -- | X | -- | -- | -- | X | -- | X (ND) |
| Copper | 7440-50-8 | -- | -- | X | -- | -- | -- | X | -- | -- | -- | -- | -- | -- |
| Iron | 7439-89-6 | X | X | X | X | X | -- | X | -- | -- | X | X | -- | -- |
| Lead | 7439-92-1 | -- | -- | X | -- | X | -- | X | -- | -- | -- | X | -- | -- |
| Magnesium | 7439-95-4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Manganese | 7439-96-5 | X | -- | X | -- | -- | -- | X | -- | -- | -- | X | -- | -- |
| Mercury | 7439-97-6 | -- | -- | X | -- | -- | -- | -- | -- | -- | -- | X | X | -- |
| Nickel | 7440-02-0 | X | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Potassium | 7440-09-7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Selenium | 7782-49-2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Silver | 7440-22-4 | -- | -- | X | -- | -- | -- | X | -- | -- | -- | -- | -- | -- |
| Sodium | 7440-23-5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Thallium | 7440-28-0 | X | X | X | X | X (ND) | X (ND) | X (ND) | -- | X (ND) | X (ND) | X | -- | X (ND) |
| Vanadium | 7440-62-2 | -- | -- | X | -- | -- | -- | -- | -- | -- | -- | X | -- | X (ND) |
| Zinc | 7440-66-6 | -- | -- | X | -- | -- | -- | X | -- | -- | -- | X | -- | -- |

**Notes:**
CASRN = chemical abstract service registry number; COI = constituent of interest; HH COI = human health constituent of interest; HHRA = human health risk assessment; NA = not applicable;
GW = groundwater; SVOC = semi-volatile organic compound; VI = vapor intrusion; VOC = volatile organic compound
X = indicates chemical is a medium-specific HH COI and is quantified in the HHRA
Empty cell indicates that it is not a HH COI
*Analytes* = non-detect, but the laboratory reporting limit exceeded the screening value.
X (ND) = indicates chemical is non-detect (ND) but the detection limit analysis identified it as a HH COI (i.e., quantified separately in the HHRA).

**Chemical Abbreviations:**
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethylene
2,3,7,8-TCDD = 2,3,7,8- Tetrachlorodibenzo-p-dioxin
TEQ = Toxicity Equivalence

**Table 4-1**
**Selection of Exposure Pathways**
**Remedial Investigation Report**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population [2] | Receptor Age | Exposure Route | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|---|---|---|---|---|---|---|---|---|
| Current/Future | Surface Soil | Surface Soil | Surface Soil | Outdoor Maintenance Worker | Adult | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact surface soil from the site while conducting routine maintenance activities (i.e., mowing lawns). |
| | | | | Outdoor Recreator | Child | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact surface soil while engaging in recreational activities at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |
| | | | | Trespasser | Teenager | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact surface soil while trespassing at the site. |
| | | Air | Outdoor Ambient Air Above Surface Soil (Vapors and Particulates) | Outdoor Maintenance Worker | Adult | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the surface soil. |
| | | | | Outdoor Recreator | Child | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the surface soil. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the surface soil. |
| | | | Upward Migration of Vapors from Surface Soil (Indoors) | Outdoor Maintenance Worker | Adult | Inhalation | None | Receptor is assumed to spend most of his/her time outdoors. |
| | | | | Outdoor Recreator | Child | Inhalation | None | Receptor is assumed to spend his/her time outdoors. Receptor is not likely to inhale vapors/particulates from indoor air in any significant quantities. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | None | Receptor is assumed to spend his/her time outdoors. Receptor is not likely to inhale vapors/particulates from indoor air in any significant quantities. |
| Current/Future | Subsurface Soil | Subsurface Soil | Subsurface Soil | Outdoor Maintenance Worker | Adult | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact subsurface soil when mixed with surface soil following land redevelopment activities. |
| | | | | Outdoor Recreator | Child | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact subsurface soil when mixed with surface soil following land redevelopment activities. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to subsurface soil following land redevelopment activities. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |
| | | | | Trespasser | Teenager | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact subsurface soil when mixed with surface soil following land redevelopment activities. |
| | | Air | Outdoor Ambient Air Above Subsurface Soil (Vapors and Particulates) | Outdoor Maintenance Worker | Adult | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities. |
| | | | | Outdoor Recreator | Child | Inhalation | None | Receptor is not likely to inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities in any significant quantities. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | Quant | Receptor is not likely to inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities in any significant quantities. |
| | | | Upward Migration of Vapors from Subsurface Soil (Indoors) | Outdoor Maintenance Worker | Adult | Inhalation | None | Receptor is assumed to spend most of their time outdoors. |
| | | | | Outdoor Recreator | Child | Inhalation | None | Receptor is assumed to spend time outdoors. Receptor is not likely to inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities in any significant quantities. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | None | Receptor is assumed to spend time outdoors. Receptor is not likely to inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities in any significant quantities. |

**Table 4-1**
**Selection of Exposure Pathways**
**Remedial Investigation Report**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population [2] | Receptor Age | Exposure Route | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|---|---|---|---|---|---|---|---|---|
| Current/Future | Sediment | Sediment | Sediment | Outdoor Maintenance Worker | Adult | Ingestion<br>Dermal Absorption | Quant | Receptor could ingest/contact sediment from the site while conducting routine maintenance activities (i.e., mowing lawns). |
| | | | | Outdoor Recreator | Child | Ingestion<br>Dermal Absorption | Quant | Receptor could ingest/contact sediment while engaging in recreational activities at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to sediment. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |
| | | | | Trespasser | Teenager | Ingestion<br>Dermal Absorption | Quant | Receptor could ingest/contact sediment while trespassing at the site. |
| | | | Sediment to Blue Crab | Outdoor Maintenance Worker | Adult | Ingestion | None | Receptor is not likely to ingest/contact blue crab. |
| | | | | Outdoor Recreator | Child | Ingestion | Quant | Receptor could ingest/contact blue crab while engaging in recreational activities at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to sediment via blue crab. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |
| | | | | Trespasser | Teenager | Ingestion | Quant | Receptor could ingest/contact blue crab while trespassing at the site. |
| Current/Future | Groundwater | Groundwater | Groundwater | Outdoor Maintenance Worker | Adult | Ingestion<br>Dermal Absorption | None | Receptor is not likely to ingest/contact groundwater from the site during maintenance activities. |
| | | | | Outdoor Recreator | Child | Ingestion<br>Dermal Absorption | None | Receptor is not likely to ingest/contact groundwater while engaging in recreational activities at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Off-site Resident [1] | Child | Ingestion<br>Dermal Absorption | None | Receptor ingests/contacts groundwater in the Yorktown Aquifer only. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Ingestion<br>Dermal Absorption | None | Receptor is not likely to ingest/contact groundwater while trespassing on site. |
| | | Air | Upward Migration of Vapors from Groundwater (Outdoors) | Outdoor Maintenance Worker | Adult | Inhalation | Quant | Receptor could inhale VOCs that migrated upward from groundwater to ambient air. |
| | | | | Outdoor Recreator | Child | Inhalation | None | Receptor is not likely to inhale VOCs that migrated upward from groundwater to ambient air. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | None | Receptor is not likely to inhale VOCs that migrated upward from groundwater to ambient air. |
| | | | Upward Migration of Vapors from Groundwater (Indoors) | Outdoor Maintenance Worker | Adult | Inhalation | None | Receptor is assumed to spend most of his/her time outdoors. |
| | | | | Outdoor Recreator | Child | Inhalation | None | Receptor is assumed to spend his/her time outdoors. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | None | Receptor is assumed to spend most of their time outdoors. |
| | | Air | Vapors while Showering | Outdoor Maintenance Worker | Adult | Inhalation | None | Receptor is unlikely to shower using groundwater due to groundwater use deed restriction at the site and receptor is assumed to be outdoors. |
| | | | | Outdoor Recreator | Child | Inhalation | None | Receptor is unlikely to shower using groundwater due to groundwater use deed restriction at the site and receptor is assumed to be outdoors. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Off-site Resident [1] | Child | Ingestion<br>Dermal Absorption | None | Receptor is exposed to groundwater in the Yorktown Aquifer only. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | |
| | | | | Trespasser | Teenager | Inhalation | None | Receptor is unlikely to shower using groundwater due to groundwater use deed restriction at the site and receptor is assumed to be outdoors. |

**Table 4-1**
**Selection of Exposure Pathways**
**Remedial Investigation Report**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population [(2)] | Receptor Age | Exposure Route | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|---|---|---|---|---|---|---|---|---|
| Current/Future | Surface Water | Surface Water | Surface Water | Outdoor Maintenance Worker | Adult | Ingestion<br>Dermal Absorption | Quant | Receptor may come into contact surface water from the site during maintenance activities. |
| | | | | Outdoor Recreator | Child | Ingestion<br>Dermal Absorption | Quant | Receptor may come into contact with surface water while engaging in recreational activities at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to surface water. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |
| | | | | Trespasser | Teenager | Ingestion<br>Dermal Absorption | Quant | Receptor may come into contact with surface water while trespassing on site. |
| Current/Future | Surface Water | Surface Water | Surface Water to Fish Tissue | Outdoor Maintenance Worker | Adult | Ingestion | Quant | Receptor is not likely to ingest/contact fish tissue. |
| | | | | Outdoor Recreator | Child | Ingestion | Quant | Receptor could ingest/contact fish tissue while engaging in recreational activities at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to surface water via fish tissue. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |
| | | | | Trespasser | Teenager | Ingestion | Quant | Receptor could ingest/contact fish tissue while trespassing at the site. |
| Future | Surface Soil | Surface Soil | Surface Soil | Indoor/outdoor Commercial Worker | Adult | Ingestion<br>Dermal Absorption | Quant | Receptor could ingest/contact surface soil while working at the site. |
| | | | | Construction Worker | Adult | Ingestion<br>Dermal Absorption | Quant | Receptor could ingest/contact surface soil from the site during construction activities. |
| | | | | Hypothetical Resident | Child | Ingestion<br>Dermal Absorption | Quant | Receptor could ingest/contact surface soil while living on site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | Air | Ambient Air Above Surface Soil (Vapors and Particulates) | Indoor/outdoor Commercial Worker | Adult | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the surface soil. |
| | | | | Construction Worker | Adult | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the surface soil. |
| Future | Surface Soil | Air | Ambient Air Above Surface Soil (Vapors and Particulates) | Hypothetical Resident | Child | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the surface soil while living on site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | | Upward Migration of Vapors from Soil (Indoors) | Indoor/outdoor Commercial Worker | Adult | Inhalation | Qual | Receptor could inhale VOCs from soil via vapor intrusion into building while working indoors. EPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway. |
| | | | | Construction Worker | Adult | Inhalation | Qual | Receptor is assumed to spend most of his/her time outdoors. |
| | | | | Hypothetical Resident | Child | Inhalation | Qual | Receptor could inhale VOCs from soil via vapor intrusion into residence. EPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident. |

**Table 4-1**
**Selection of Exposure Pathways**
**Remedial Investigation Report**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population [2] | Receptor Age | Exposure Route | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|---|---|---|---|---|---|---|---|---|
| Future | Subsurface Soil | Subsurface Soil | Subsurface Soil | Indoor/outdoor Commercial Worker | Adult | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact subsurface soil when mixed with surface soil following land redevelopment activities. |
| | | | | Construction Worker | Adult | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact subsurface soil from the site while during construction activities. |
| | | | | Hypothetical Resident | Child | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact subsurface soil when mixed with surface soil from construction of a residence. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | Subsurface Soil | Air | Ambient Air Above Subsurface Soil (Vapors and Particulates) | Indoor/outdoor Commercial Worker | Adult | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the subsurface when mixed with surface soil following land redevelopment activities. |
| | | | | Construction Worker | Adult | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the subsurface soil during construction activities. |
| | | | | Hypothetical Resident | Child | Inhalation | Quant | Receptor could inhale vapors/particulates from ambient air above the subsurface soil when mixed with surface soil from construction of a residence. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to subsurface soil. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | | Upward Migration of Vapors from Soil (Indoors) | Indoor/outdoor Commercial Worker | Adult | Inhalation | Qual | Receptor could inhale VOCs from soil via vapor intrusion into building while working indoors. EPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway. |
| | | | | Construction Worker | Adult | Inhalation | Qual | Receptor is assumed to spend most of his/her time outdoors. |
| | | | | Hypothetical Resident | Child | Inhalation | Qual | Receptor could inhale VOCs from soil via vapor intrusion into residence. EPA (2015) guidance recommends using groundwater data for evaluating this exposure pathway. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to surface soil. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | Sediment | Sediment | Sediment | Indoor/outdoor Commercial Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not anticipated to ingest/contact sediment while working at the site. |
| | | | | Construction Worker | Adult | Ingestion | None | Receptor is not anticipated to ingest/contact sediment while working at the site. |
| Future | Sediment | Sediment | Sediment | Hypothetical Resident | Child | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact sediment while living at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to sediment. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | | Sediment to Blue Crab | Indoor/outdoor Commercial Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not likely to ingest/contact blue crab. |
| | | | | Construction Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not likely to ingest/contact blue crab. |
| | | | | Hypothetical Resident | Child | Ingestion Dermal Absorption | Quant | Receptor could ingest/contact blue crab while living at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to sediment via blue crab. The non-cancer hazard evaluations are treated separately for child and adult Outdoor Recreator. |

**Table 4-1**
**Selection of Exposure Pathways**
**Remedial Investigation Report**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population [2] | Receptor Age | Exposure Route | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|---|---|---|---|---|---|---|---|---|
| Future | Groundwater | Groundwater | Groundwater | Indoor/outdoor Commercial Worker | Adult | Ingestion Dermal Absorption | None | Receptor could possibly ingest/contact groundwater since groundwater use is not deed restricted. The risk encountered by the resident is assumed to be protective. |
| | | | | Construction Worker | Adult | Ingestion Dermal Absorption | Quant | Due to the depth to groundwater (above 15 ft bgs), the receptor could ingest/contact groundwater during excavation activities. |
| | | | | Hypothetical Resident | Child | Ingestion Dermal Absorption | Quant | Receptor could possibly ingest/contact groundwater since groundwater use is not deed restricted. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to groundwater. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | | | Off-site Resident [1] | Child | Ingestion Dermal Absorption | Quant | Receptor ingests/contacts groundwater in the Yorktown Aquifer only. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to groundwater. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | Air | Upward Migration of Vapors from Groundwater (Outdoors) | Indoor/outdoor Commercial Worker | Adult | Inhalation | Quant | Receptor could inhale VOCs that migrated upward from groundwater to ambient air. |
| | | | | Construction Worker | Adult | Inhalation | Quant | Receptor could inhale VOCs that migrated upward from groundwater to ambient air during excavation activities. |
| | | | | Hypothetical Resident | Child | Inhalation | Quant | Receptor could inhale VOCs that migrated upward from groundwater to ambient air. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to groundwater. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | | Upward Migration of Vapors from Groundwater (Indoors) | Indoor/outdoor Commercial Worker | Adult | Inhalation | Quant | Receptor could inhale VOCs from groundwater via vapor intrusion into commercial building. |
| | | | | Construction Worker | Adult | Inhalation | None | Receptor is assumed to spend most of his/her time outdoors. |
| | | | | Hypothetical Resident | Child | Inhalation | Quant | Receptor could inhale VOCs from groundwater via vapor intrusion into residence. |
| | | | | | Adult | | | |
| Future | Groundwater | Air | Upward Migration of Vapors from Groundwater (Indoors) | Hypothetical Resident | Child/Adult | Inhalation | Quant | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to groundwater. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | | | Vapors while Showering | Indoor/outdoor Commercial Worker | Adult | Inhalation | None | Receptor could possibly inhale vapors while showering since groundwater use is not deed restricted. The risk encountered by the resident is assumed to be protective. |
| | | | | Construction Worker | Adult | Inhalation | None | Receptor is assumed to spend most of his/her time outdoors. |
| | | | | Hypothetical Resident | Child | Inhalation | Quant | Receptor could possibly inhale vapors while showering assuming that groundwater is used as a tap water source since the site does not have groundwater use deed restrictions in place. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to groundwater. The non-cancer hazard evaluations are treated separately for child and adult resident. |

**Table 4-1**
**Selection of Exposure Pathways**
**Remedial Investigation Report**
**Project 15 CL, Wallops Flight Facility**
**Wallops Island, Virginia**

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population [2] | Receptor Age | Exposure Route | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|---|---|---|---|---|---|---|---|---|
| Future | Groundwater | Air | Vapors while Showering | Off-site Resident [1] | Child | Inhalation | Quant | Receptor could inhale vapors while showering from Yorktown Aquifer groundwater only. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult resident (24 years) and child resident (6 years) are added together (30 years) to address lifetime exposure to groundwater. The non-cancer hazard evaluations are treated separately for child and adult resident. |
| | Surface Water | Surface Water | Surface Water | Indoor/outdoor Commercial Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not anticipated to ingest/contact surface water while working at the site. |
| | | | | Construction Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not anticipated to ingest/contact surface water while working at the site. |
| | | | | Hypothetical Resident | Child | Ingestion Dermal Absorption | Quant | Receptor could possibly come into contact with surface water while residing at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to surface water. The non-cancer hazard evaluations are treated separately for child and adult Resident. |
| | | Surface Water | Surface Water to Fish Tissue | Indoor/outdoor Commercial Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not likely to ingest/contact fish tissue. |
| | | | | Construction Worker | Adult | Ingestion Dermal Absorption | None | Receptor is not likely to ingest/contact fish tissue. |
| | | | | Hypothetical Resident | Child | Ingestion | Quant | Receptor could possibly come into contact with surface water while residing at the site. |
| | | | | | Adult | | | |
| | | | | | Child/Adult | | | The cancer risk estimates for the adult Outdoor Recreator (24 years) and child Outdoor Recreator (6 years) are added together (30 years) to address lifetime exposure to surface water via fish tissue. The non-cancer hazard evaluations are treated separately for child and adult Resident. |

Notes:
(1) The off-site hypothetical resident is exposed to the Yorktown aquifer groundwater only. The Yorktown aquifer is too deep to be evaluated for vapor intrusion or construction worker exposure.

**Table 4-2**
**Summary of Transport/Fate Models Used in HHRA**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure Medium / Exposure Pathway | Potential Receptor | Fate and Transport Model |
|---|---|---|
| Soil – inhalation of fugitive dust in outdoor air | Outdoor maintenance worker, outdoor recreator (child/adult), teen trespasser, indoor/outdoor commercial worker, construction worker, and hypothetical resident (child/adult) | Minneapolis, MN constants were used for the site-specific PEF in the soil-to-outdoor air calculations.<br>(EPA, 2002) |
| Soil – inhalation of vapor in outdoor air | Outdoor maintenance worker, outdoor recreator (child/adult), teen trespasser, indoor/outdoor commercial worker, construction worker, and hypothetical resident (child/adult) | Minneapolis, MN constants were used for the chemical-specific volatilization factors (VFs) in the soil-to-outdoor air calculations.<br>(EPA, 2002) |
| Groundwater – inhalation of vapor in outdoor air or trench air | Outdoor maintenance worker, indoor/outdoor commercial worker, construction worker, and hypothetical resident (child/adult) | Chemical-specific $VF_{w, amb}$ (ASTM, 2015) and groundwater vapors in trench air ($VF_{w, trench}$) (VDEQ, 2021) |
| Groundwater – inhalation of vapor in indoor air | Indoor/outdoor commercial worker and hypothetical resident (child/adult) | EPA's VISL (May 2021) was used to derive indoor air concentrations.<br>Foster and Chrostowski shower model was used to derive shower air concentrations (Foster and Chrostowski, 1987) |
| Sediment – ingestion of Blue Crab | Outdoor recreator (child/adult), teen trespasser, and hypothetical resident (child/adult) | Crab tissue concentrations were modeled using sediment concentrations (EPA, 2005a and ODEQ, 2007) |
| Surface Water – ingestion of fish | Outdoor recreator (child/adult), teen trespasser, and hypothetical resident (child/adult) | Fish tissue concentrations were modeled using surface water concentrations (EPA, 2005a). |

## Table 4-3
## Lead Screening in Groundwater
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Chemical/ Media | Number of Detects | Number of Sample Points | Minimum Detection (µg/L) | Maximum Detection (µg/L) | Maximum Sample Location | Mean (µg/L) | EPA Residential Tapwater RSL[(a)] (µg/L) | Mean Exceeds Action Level? |
|---|---|---|---|---|---|---|---|---|
| **Site-wide** | | | | | | | | |
| **Lead - Groundwater** | **18** | **51** | **1.6** | **140** | **MW-05** | **10.7** | **15** | **No** |

(a) EPA, 2021a. Residential Regional Screening Level (RSL) Table, Dated May 2021

EPA = US Environmental Protection Agency; µg/L = micrograms per liter

## Table 4-4
## Lead Screening in Soil
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Chemical/ Media | Number of Detects | Number of Sample Points | Minimum Detection (mg/kg) | Maximum Detection (mg/kg) | Maximum Sample Location | Mean (mg/kg) | EPA Residential Soil RSL[(a)] (mg/kg) | Mean Exceeds Action Level? |
|---|---|---|---|---|---|---|---|---|
| **Central AOC** | | | | | | | | |
| Lead – Total soil | 16 | 16 | 2.6 | 4900 | CDL-DPS02-00-020 | 394.6 | 200 | Yes |
| **Southern AOC** | | | | | | | | |
| Lead – Surface soil | 14 | 14 | 5.4 | 2120 | TP-3A | 524.7 | 200 | Yes |
| Lead – Total soil | 26 | 26 | 5.4 | 22000 | CDL-DPS04-00-15 | 1437 | 200 | Yes |

(a) EPA, 2021a. Residential Regional Screening Level (RSL) Table, Dated May 2021. One half the EPA Region 3 residential soil screening level was used.

EPA = US Environmental Protection Agency; mg/kg = milligrams per kilogram

**Table 4-5**
**Summary of Lead Model Results**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor | Lead Model | Lead Mean EPC (mg/kg) | Target PbB Threshold of 5 µg/dL | Target Probability Threshold of 5% | Above Thresholds? (Yes/No) |
|---|---|---|---|---|---|
| | | | Estimated PbB Concentration (µg/dL) | Percent Probability Threshold (%) | |
| **Central AOC, Total Soil** | | | | | |
| Outdoor Maintenance Worker Scenario | ALM | 394.6 | Worker 1.2; Fetus 2.8 | 0.4% | No |
| Construction Worker Scenario | ALM | 394.6 | Worker 1.7; Fetus 4.1 | 2% | No |
| Trespasser Scenario | ALM | 394.6 | Worker 1.1; Fetus 2.6 | 0.3% | No |
| Resident (Child/Adult/Lifetime) Scenario | IEUBK | 394.6 | Child 4.2 | 36% | Yes |
| **Southern AOC, Surface Soil** | | | | | |
| Outdoor Maintenance Worker Scenario | ALM | 524.7 | Worker 1.4; Fetus 3.2 | 0.8% | No |
| Trespasser Scenario | ALM | 524.7 | Worker 1.3; Fetus 3.0 | 0.6% | No |
| Resident (Child/Adult/Lifetime) Scenario | IEUBK | 524.7 | Child 4.9 | 48% | Yes |
| **Southern AOC, Total Soil** | | | | | |
| Outdoor Maintenance Worker Scenario | ALM | 1437 | Worker 2.7; Fetus 6.3 | 11% | Yes |
| Construction Worker Scenario | ALM | 1437 | Worker 4.7; Fetus 11 | 39% | Yes |
| Trespasser Scenario | ALM | 1437 | Worker 2.4; Fetus 5.8 | 8% | Yes |
| Resident (Child/Adult/Lifetime) Scenario | IEUBK | 1437 | Child 9.2 | 90% | Yes |

ALM = Adult Lead Methodology; AOC = area of concern; EPC = exposure point concentration; IEUBK = Integrated Exposure Uptake Biokinetic; mg/kg = milligram per kilogram; µg/dL = microgram per deciliter; PbB = blood lead

# Table 5-1
# Summary of Absorption Factors
# Human Health Risk Assessment
# Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Chemical of Potential Concern | GIABS [a] (%) | ABS [a, b] (unitless) | RBA [c] (unitless) |
|---|---|---|---|
| **Volatile Organic Compounds (VOCs)** | | | |
| 1,1,2,2-Tetrachloroethane | 1 | 0.03 | 1 |
| 1,1,2-Trichloroethane | 1 | 0.03 | 1 |
| 1,2,4-Trichlorobenzene | 1 | 0.03 | 1 |
| 1,2-Dibromo-3-chloropropane | 1 | 0.03 | 1 |
| 1,2-Dibromoethane | 1 | 0.03 | 1 |
| 1,2-Dichloroethane | 1 | 0.03 | 1 |
| 1,2-Dichloropropane | 1 | 0.03 | 1 |
| 1,4-Dichlorobenzene | 1 | 0.03 | 1 |
| 2-Hexanone | 1 | 0.03 | 1 |
| Benzene | 1 | 0.0005 | 1 |
| Bromodichloromethane | 1 | 0.03 | 1 |
| Bromoform | 1 | 0.03 | 1 |
| Bromomethane | 1 | 0.0005 | 1 |
| Carbon tetrachloride | 1 | 0.0005 | 1 |
| Chloroform | 1 | 0.0005 | 1 |
| cis-1,2-Dichloroethene | 1 | 0.0005 | 1 |
| cis-1,3-Dichloropropene | -- | 0.03 | 1 |
| Cyclohexane | 1 | 0.0005 | 1 |
| Dibromochloromethane | 1 | 0.03 | 1 |
| Dichlorodifluoromethane | 1 | 0.0005 | 1 |
| Ethylbenzene | 1 | 0.03 | 1 |
| Hexachlorobutadiene | 1 | 0.03 | 1 |
| Isopropylbenzene | 1 | 0.03 | 1 |
| m,p-Xylene | 1 | 0.03 | 1 |
| Methylcyclohexane | -- | 0.03 | 1 |
| Naphthalene | 1 | 0.03 | 1 |
| o-Xylene | 1 | 0.03 | 1 |
| Tetrachloroethene | 1 | 0.03 | 1 |
| Toluene | 1 | 0.03 | 1 |
| trans-1,3-Dichloropropene | -- | 0.03 | 1 |
| Trichloroethene | 1 | 0.03 | 1 |
| Vinyl chloride | 1 | 0.0005 | 1 |
| Xylene (total) | 1 | 0.03 | 1 |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | |
| 1,1'-Biphenyl | 1 | 0.1 | 1 |
| 2,4,6-Trichlorophenol | 1 | 0.1 | 1 |
| 2,4-Dinitrotoluene | 1 | 0.102 | 1 |
| 2,6-Dinitrotoluene | 1 | 0.099 | 1 |

# Table 5-1
# Summary of Absorption Factors
# Human Health Risk Assessment
# Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Chemical of Potential Concern | GIABS [(a)] (%) | ABS [(a, b)] (unitless) | RBA [(c)] (unitless) |
|---|---|---|---|
| 2-Methylnaphthalene | 1 | 0.13 | 1 |
| 2-Nitrophenol | -- | 0.1 | 1 |
| 3,3'-Dichlorobenzidine | 1 | 0.1 | 1 |
| 4,6-Dinitro-o-cresol | 1 | 0.1 | 1 |
| 4-Chloroaniline | 1 | 0.1 | 1 |
| 4-Nitrophenol | -- | 0.1 | 1 |
| Atrazine | 1 | 0.1 | 1 |
| Benzo(a)anthracene | 1 | 0.13 | 1 |
| Benzo(a)pyrene | 1 | 0.13 | 1 |
| Benzo(b)fluoranthene | 1 | 0.13 | 1 |
| Benzo(k)fluoranthene | 1 | 0.13 | 1 |
| bis(2-Chloroethyl)ether | 1 | 0.1 | 1 |
| bis(2-Ethylhexyl)phthalate | 1 | 0.1 | 1 |
| Butyl benzyl phthalate | 1 | 0.1 | 1 |
| Chrysene | 1 | 0.13 | 1 |
| Dibenzo(a,h)anthracene | 1 | 0.13 | 1 |
| Dibenzofuran | 1 | 0.1 | 1 |
| Hexachlorobenzene | 1 | 0.1 | 1 |
| Hexachlorocyclopentadiene | 1 | 0.1 | 1 |
| Hexachloroethane | 1 | 0.1 | 1 |
| Indeno(1,2,3-cd)pyrene | 1 | 0.13 | 1 |
| Nitrobenzene | 1 | 0.1 | 1 |
| N-Nitroso-di-n-propylamine | 1 | 0.1 | 1 |
| Pentachlorophenol | 1 | 0.25 | 1 |
| **Pesticides** | | | |
| 4,4'-DDD | 1 | 0.1 | 1 |
| 4,4'-DDE | 1 | 0.1 | 1 |
| 4,4'-DDT | 1 | -- | -- |
| Aldrin | 1 | -- | -- |
| alpha-BHC | 1 | -- | -- |
| Dieldrin | 1 | -- | -- |
| Heptachlor | 1 | -- | -- |
| Heptachlor epoxide | 1 | -- | -- |
| Toxaphene | 1 | -- | -- |
| **Polychlorinated Biphenyls (PCBs)** | | | |
| Aroclor 1221 | 1 | 0.14 | 1 |
| Aroclor 1232 | 1 | 0.14 | 1 |
| Aroclor 1242 | 1 | 0.14 | 1 |
| Aroclor 1248 | 1 | 0.14 | 1 |

# Table 5-1
# Summary of Absorption Factors
# Human Health Risk Assessment
# Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Chemical of Potential Concern | GIABS [(a)] (%) | ABS [(a, b)] (unitless) | RBA [(c)] (unitless) |
|---|---|---|---|
| Aroclor 1254 | 1 | 0.14 | 1 |
| Aroclor 1260 | 1 | 0.14 | 1 |
| **Dioxins and Furans** | | | |
| 2,3,7,8-TCDD | 1 | 0.03 | 1 |
| **Cyanide** | | | |
| Cyanide | 1 | -- | -- |
| **Metals** | | | |
| Aluminum | 1 | 0.01 | 1 |
| Antimony | 0.15 | 0.01 | 1 |
| Arsenic | 1 | 0.03 | 0.6 |
| Barium | 0.07 | 0.01 | 1 |
| Beryllium | 0.007 | 0.01 | 1 |
| Cadmium | 0.025 | 1 | 0.001 |
| Chromium | 0.013 | 0.01 | 1 |
| Cobalt | 1 | 0.01 | 1 |
| Copper | 1 | 0.01 | 1 |
| Iron | 1 | 0.01 | 1 |
| Lead | 1 | -- | -- |
| Manganese | 1 | 0.01 | 1 |
| Mercury | 1 | 0.01 | 1 |
| Nickel | 0.04 | 0.01 | 1 |
| Selenium | 1 | 0.01 | 1 |
| Silver | 0.04 | 0.01 | 1 |
| Thallium | 1 | 0.01 | 1 |
| Vanadium | 0.026 | 0.01 | 1 |
| Zinc | 1 | 0.01 | 1 |

**Notes:**

ABS = dermal absorption fraction; GIABS = gastrointestinal absorption factor; NA = not applicable; RBA = relative bioavailability factor

(a) USEPA, 2004. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, July 2004.

(b) USEPA, 2016. “Assessing Dermal Exposure from Soil,” EPA Region 3 Technical Guidance Manual. Last updated September 23, 2016. https://www.epa.gov/risk/updated-dermal-exposure-assessment-guidance

(c) USEPA, 2012. OSWER Directive 9200.1-113: Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil . Washington, DC.

**Table 6-1**
**Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Central/Southern (C/S) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, C/S** | | | | |
| Soil | 7E-05 | 0.5 | 4E-05 | **3** |
| Groundwater | 6E-09 | 0.0001 | 6E-09 | 0.0001 |
| **Cumulative Total** | 7E-05 | 0.5 | 4E-05 | **3** |
| **Teen Trespasser, C/S - Soil Only** | 8E-06 | 0.3 | 5E-06 | 0.6 |
| **Child Outdoor Recreator, C/S - Soil Only** | NA | **4** | NA | **7** |
| **Adult Outdoor Recreator, C/S - Soil Only** | NA | 0.3 | NA | 1 |
| **Lifetime Outdoor Recreator, C/S - Soil Only** | **6E-04** | NA | **3E-04** | NA |
| **Indoor/Outdoor Commercial Worker, C/S** | | | | |
| Soil | NA | NA | 4E-05 | **4** |
| Groundwater | NA | NA | **4E-04** | **7** |
| **Cumulative Total** | NA | NA | **4E-04** | **11** |
| **Construction Worker, C/S** | | | | |
| Soil | NA | NA | 6E-06 | **5** |
| Groundwater | NA | NA | 4E-05 | **11** |
| **Cumulative Total** | NA | NA | 4E-05 | **16** |
| **Child Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **22** |
| Groundwater | NA | NA | **--** | **53** |
| **Cumulative Total** | NA | NA | -- | **75** |
| **Adult Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **13** |
| Groundwater | NA | NA | **--** | **45** |
| **Cumulative Total** | NA | NA | -- | **57** |
| **Lifetime Resident, C/S** | | | | |
| Soil | NA | NA | **6E-04** | -- |
| Groundwater | NA | NA | **3E-03** | -- |
| **Cumulative Total** | NA | NA | **3E-03** | -- |
| **Northern/Western (N/W) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, N/W** | | | | |
| Soil | 5E-06 | 0.05 | 5E-06 | 0.05 |
| Groundwater | 6E-09 | 0.0001 | 6E-09 | 0.0001 |
| **Cumulative Total** | 5E-06 | 0.05 | 5E-06 | 0.05 |
| **Teen Trespasser, N/W - Soil Only** | 6E-07 | 0.02 | 6E-07 | 0.02 |
| **Child Outdoor Recreator, N/W - Soil Only** | -- | 0.4 | NA | 0.4 |
| **Adult Outdoor Recreator, N/W - Soil Only** | -- | 0.04 | NA | 0.04 |

## Table 6-1
## Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Lifetime Outdoor Recreator, N/W - Soil Only** | 4E-05 | -- | 4E-05 | NA |
| **Indoor/Outdoor Commercial Worker, N/W** | | | | |
| Soil | NA | NA | 5E-06 | 0.06 |
| Groundwater | NA | NA | **4E-04** | **7** |
| **Cumulative Total** | NA | NA | **4E-04** | **7** |
| **Construction Worker, N/W** | | | | |
| Soil | NA | NA | 6E-07 | 0.2 |
| Groundwater | NA | NA | 4E-05 | **11** |
| **Cumulative Total** | NA | NA | 4E-05 | **11** |
| **Child Resident, N/W** | | | | |
| Soil | NA | NA | **--** | **0.8** |
| Groundwater | NA | NA | **--** | **53** |
| **Cumulative Total** | NA | NA | -- | **54** |
| **Adult Resident, N/W** | | | | |
| Soil | NA | NA | **--** | **0.08** |
| Groundwater | NA | NA | **--** | **45** |
| **Cumulative Total** | NA | NA | -- | **45** |
| **Lifetime Resident, N/W** | | | | |
| Soil | NA | NA | **7E-05** | -- |
| Groundwater | NA | NA | **3E-03** | -- |
| **Cumulative Total** | NA | NA | **3E-03** | -- |
| **Upgradient Drainage Exposure Area - Surface Water and Sediment** | | | | |
| Outdoor Worker, U/D | 1E-05 | 0.04 | NA | NA |
| Teen Trespasser, U/D | 2E-06 | 0.003 | NA | NA |
| Child Outdoor Recreator, U/D | -- | 0.2 | NA | NA |
| Adult Outdoor Recreator, U/D | -- | 0.02 | NA | NA |
| Lifetime Outdoor Recreator, U/D | 5E-05 | -- | NA | NA |
| **Downgradient/Estuarine Exposure Area - Surface Water and Sediment** | | | | |
| Teen Trespasser, D/E | 4E-06 | 0.01 | NA | NA |
| Child Outdoor Recreator, D/E | -- | 0.4 | NA | NA |
| Adult Outdoor Recreator, D/E | -- | 0.06 | NA | NA |
| Lifetime Outdoor Recreator, D/E | 7E-05 | -- | NA | NA |

**Notes:**

-- = COPCs do not exhibit toxicological health effects to calculate either cancer risks or hazards for this pathway.

COPC = chemical of potential concern; C/S = Central/Southern; D/E = Downgradient/Estuarine;

NA = Not Applicable; N/W = Northern/Western; UD = Upgradient Drainage

## Table 6-1
## Summary of Cancer Risk and Non-Cancer Hazards - Reasonable Maximum Exposure
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor and Exposure Area | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |

*Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

** Risk-based screen results did not identify any detected groundwater COPCs in the deeper Yorktown Aquifer; offsite residential exposure to groundwater was not evaluated.

**EPA Target Thresholds (Exceedances are Shaded):**

- Target Cumulative Cancer Risk Threshold of 1×10-4 (1E-04).
- Target Non-Cancer Hazard Threshold, or Hazard Index (HI), of 1.

**Table 6-2**
**Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Central/Southern (C/S) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, C/S** | | | | |
| Soil | 6E-06 | 0.2 | 4E-06 | **3** |
| Groundwater | 1E-09 | 0.0001 | 1E-09 | 0.0001 |
| **Cumulative Total** | 6E-06 | 0.2 | 4E-06 | **3** |
| **Teen Trespasser, C/S - Soil Only** | 2E-06 | 0.3 | 2E-06 | 0.5 |
| **Child Outdoor Recreator, C/S - Soil Only** | NA | 0.5 | NA | 0.9 |
| **Adult Outdoor Recreator, C/S - Soil Only** | NA | 0.04 | NA | 0.3 |
| **Lifetime Outdoor Recreator, C/S - Soil Only** | **1E-04** | NA | 7E-05 | NA |
| **Indoor/Outdoor Commercial Worker, C/S** | | | | |
| Soil | NA | NA | 4E-06 | **2** |
| Groundwater | NA | NA | 5E-05 | **4** |
| **Cumulative Total** | NA | NA | 6E-05 | **5** |
| **Construction Worker, C/S** | | | | |
| Soil | NA | NA | 6E-07 | **2** |
| Groundwater | NA | NA | 9E-06 | **6** |
| **Cumulative Total** | NA | NA | 1E-05 | **7** |
| **Child Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **4** |
| Groundwater | NA | NA | **--** | **38** |
| **Cumulative Total** | NA | NA | -- | **42** |
| **Adult Resident, C/S** | | | | |
| Soil | NA | NA | **--** | **1** |
| Groundwater | NA | NA | **--** | **42** |
| **Cumulative Total** | NA | NA | -- | **43** |
| **Lifetime Resident, C/S** | | | | |
| Soil | NA | NA | **2E-04** | -- |
| Groundwater | NA | NA | **2E-03** | -- |
| **Cumulative Total** | NA | NA | **2E-03** | -- |
| **Northern/Western (N/W) Exposure Area - Soil and Groundwater** | | | | |
| **Outdoor Worker, N/W** | | | | |
| Soil | 5E-07 | 0.02 | 5E-07 | 0.02 |
| Groundwater | 1E-09 | 0.0001 | 1E-09 | 0.0001 |
| **Cumulative Total** | 5E-07 | 0.02 | 5E-07 | 0.02 |
| **Teen Trespasser, N/W - Soil Only** | 3E-07 | 0.02 | 2E-07 | 0.02 |
| **Child Outdoor Recreator, N/W - Soil Only** | NA | 0.05 | NA | 0.05 |
| **Adult Outdoor Recreator, N/W - Soil Only** | NA | 0.004 | NA | 0.004 |

**Table 6-2**
**Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |
| **Lifetime Outdoor Recreator, N/W - Soil Only** | 7E-06 | NA | 7E-06 | NA |
| **Indoor/Outdoor Commercial Worker, N/W** | | | | |
| Soil | NA | NA | 4E-07 | 0.03 |
| Groundwater | NA | NA | 5E-05 | **4** |
| **Cumulative Total** | NA | NA | 5E-05 | **4** |
| **Construction Worker, N/W** | | | | |
| Soil | NA | NA | 6E-08 | 0.04 |
| Groundwater | NA | NA | 9E-06 | **6** |
| **Cumulative Total** | NA | NA | 9E-06 | **6** |
| **Child Resident, N/W** | | | | |
| Soil | NA | NA | **--** | 0.2 |
| Groundwater | NA | NA | **--** | **38** |
| **Cumulative Total** | NA | NA | -- | **38** |
| **Adult Resident, N/W** | | | | |
| Soil | NA | NA | **--** | 0.02 |
| Groundwater | NA | NA | **--** | **42** |
| **Cumulative Total** | NA | NA | -- | **42** |
| **Lifetime Resident, N/W** | | | | |
| Soil | NA | NA | 2E-05 | -- |
| Groundwater | NA | NA | **2E-03** | -- |
| **Cumulative Total** | NA | NA | **2E-03** | -- |
| **Upgradient Drainage Exposure Area** | | | | |
| Outdoor Worker, U/D | 1E-06 | 0.02 | NA | NA |
| Teen Trespasser, U/D | 6E-07 | 0.002 | NA | NA |
| Child Outdoor Recreator, U/D | -- | 0.02 | NA | NA |
| Adult Outdoor Recreator, U/D | -- | 0.002 | NA | NA |
| Lifetime Outdoor Recreator, U/D | 8E-06 | -- | NA | NA |
| **Downgradient/Estuarine Exposure Area** | | | | |
| Teen Trespasser, D/E | 1E-06 | 0.005 | NA | NA |
| Child Outdoor Recreator, D/E | -- | 0.06 | NA | NA |
| Adult Outdoor Recreator, D/E | -- | 0.008 | NA | NA |
| Lifetime Outdoor Recreator, D/E | 1E-05 | -- | NA | NA |

**Notes:**

-- = COPCs do not exhibit toxicological health effects to calculate either cancer risks or hazards for this pathway.

COPC = chemical of potential concern; C/S = Central/Southern; D/E = Downgradient/Estuarine;

NA = Not Applicable; N/W = Northern/Western; UD = Upgradient Drainage

## Table 6-2
## Summary of Cancer Risk and Non-Cancer Hazards - Central Tendency Exposure (CTE)
## Human Health Risk Assessment
## Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia

| Receptor | Current/Future ** | | Future Only ** | |
|---|---|---|---|---|
| | Cancer Risk * | Non-Cancer Hazard | Cancer Risk * | Non-Cancer Hazard |

*Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

** Risk-based screen results did not identify any detected groundwater COPCs in the deeper Yorktown Aquifer; offsite residential exposure to groundwater was not evaluated.

**EPA Target Thresholds (Exceedances are Shaded):**

- Target Cumulative Cancer Risk Threshold of 1×10-4 (1E-04).
- Target Non-Cancer Hazard Threshold, or Hazard Index (HI), of 1.

**Table 6-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| **Central/Southern Exposure Area** | | | | | | | | | |
| RME | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 6E-04 | Benzo(a)pyrene | SVOC | RME only | 3E-06 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | 2E-06 | NA | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | 3E-06 | NA | |
| | | | | Arsenic | MET | RME only | 4E-06 | NA | |
| | | | | Chromium, total | MET | RME+CTE | 6E-04 | NA | |
| | | | Future: 3E-04 | 1,1,2-Trichloroethane | VOC | RME only | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | RME only | NA | 3E-06 | |
| | | | | Benzo(a)pyrene | SVOC | RME only | NA | 1E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME only | NA | 3E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME only | NA | 2E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 3E-06 | |
| | | | | Arsenic | MET | RME only | NA | 8E-06 | |
| | | | | Chromium, total | MET | RME only | NA | 2E-04 | |
| RME | Future | Indoor/Outdoor Commercial Worker, C/S | Future: 4E-04 | Benzo(a)pyrene | SVOC | RME only | NA | 1E-05 | Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | RME only | NA | 3E-06 | |
| | | | | Chromium, Total | MET | RME only | NA | 2E-05 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 3E-06 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | RME only | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME only | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | RME only | NA | 9E-05 | |
| | | | | Naphthalene | VOC | RME only | NA | 6E-06 | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 8E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 3E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 2E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-03 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | RME only | NA | 3E-06 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 2E-06 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 2E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME+CTE | NA | 6E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | RME only | NA | 3E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME+CTE | NA | 4E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 5E-06 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-05 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |

**Table 6-3**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Scenario Evaluation COC | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future | |
| CTE | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 1E-04 | Chromium, Total | MET | RME+CTE | 1E-04 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| CTE | Future | Onsite Lifetime Resident, C/S | Future: 2E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7E-05 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 2E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 3E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 4E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 7E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 2E-06 | |
| | | | | Benzo(a)anthracene | SVOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-05 | |
| | | | | Benzo(b)fluoranthene | SVOC | RME+CTE | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | RME+CTE | NA | 1E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 1E-06 | |
| | | | | Arsenic | MET | RME+CTE | NA | 3E-06 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 9E-05 | |
| **Northern/Western Exposure Area** | | | | | | | | | |
| RME | Future | Indoor/Outdoor Commercial Worker, N/W | Future: 4E-04 | 1,2-Dichloroethane | VOC | RME only | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (Vapor Intrusion [VI]) |
| | | | | Benzene | VOC | RME only | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | RME only | NA | 9E-05 | |
| | | | | Naphthalene | VOC | RME only | NA | 6E-06 | |
| | | | | Chromium, Total | MET | RME only | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |
| RME | Future | Onsite Lifetime Resident, N/W | Future: 3E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 8E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 3E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 2E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-03 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 4E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 3E-06 | |
| | | | | Arsenic | MET | RME only | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Chromium, Total | MET | RME+CTE | NA | 7E-05 | |
| CTE | Future | Onsite Lifetime Resident, N/W | Future: 2E-03 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 1E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 1E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 5E-05 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7E-05 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME+CTE | NA | 2E-05 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1E-04 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 3E-04 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 4E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | RME+CTE | NA | 7E-04 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 2E-04 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 1E-05 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 2E-06 | |
| | | | | Chromium, Total | MET | RME+CTE | NA | 2E-05 | Ingestion and Dermal Contact with Total Soil |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| **Central/Southern Exposure Area** | | | | | | | | | |
| **RME** | Outdoor Worker, C/S | Future: 3 | Respiratory System (RS) = 3 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Child Outdoor Recreator, C/S | Current/Future: 4 | Gastrointestinal (GI) = 1 | Copper | MET | RME only | 0.5 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Iron | MET | RME only | 0.5 | NA | |
| | | | Other (OT) = 1 | Antimony | MET | RME only | 0.7 | NA | |
| | | | | Nickel | MET | RME only | 0.3 | NA | |
| | | Future: 7 | Gastrointestinal (GI) = 1 | Copper | MET | RME only | NA | 0.5 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME only | NA | 0.6 | |
| | | | Hematological (HM) = 2 | Antimony | MET | RME only | NA | 2 | |
| | | | Other (OT) = 2 | Antimony | MET | RME only | NA | 2 | |
| | | | | Nickel | MET | RME only | NA | 0.3 | |
| **RME** | Indoor/Outdoor Commercial Worker, C/S | Future: 11 | Immune System (IM) = 4 | Benzene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME only | NA | 0.2 | |
| | | | Nervous System (NV) = 4 | Naphthalene | VOC | RME only | NA | 0.2 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 3 | |
| | | | Respiratory System (RS) = 3 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 3 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Construction Worker, C/S | Future: 16 | Hematological (HM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 8 | Manganese | MET | RME only | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Manganese | MET | RME+CTE | NA | 0.2 | Inhalation of Particles in Outdoor Air from Total Soil (Trench) |
| | | | | 2-Hexanone | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Total Soil (Trench) |
| | | | | Isopropylbenzene | VOC | RME+CTE | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Mercury | MET | RME only | NA | 0.1 | |
| | | | Other (OT) = 2 | Xylenes, Total | VOC | RME only | NA | 1 | |
| | | | Respiratory System (RS) = 9 | Isopropylbenzene | VOC | RME only | NA | 0.2 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | 1,1,2-Trichloroethane | VOC | RME only | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| **RME** | Onsite Child Resident, C/S | Future: 75 | Cardiovascular System (CV) = 2 | Arsenic | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Dermal (DM) = 9 | Arsenic | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Thallium | MET | RME+CTE | NA | 0.1 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 7 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | | Benzo(a)pyrene | SVOC | RME+CTE | NA | 1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Child Resident, C/S | Future: 75 | Developmental System (DV) = 3 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Endocrine (EN) = 2 | Isopropylbenzene | VOC | RME only | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Cobalt | MET | RME only | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Cobalt | MET | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Gastrointestinal (GI) = 3 | Beryllium | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Copper | MET | RME+CTE | NA | 0.9 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME+CTE | NA | 1 | |
| | | | | Iron | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Immune System (IM) = 20 | Benzene | VOC | RME+CTE | NA | 4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.1 | |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 18 | 2-Hexanone | VOC | RME only | NA | 0.2 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Aluminum | MET | RME+CTE | NA | 0.2 | |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 2-Hexanone | VOC | RME only | NA | 0.1 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Aluminum | MET | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 2 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Reproductive System (RP) = 2 | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 0.5 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Respiratory System (RS) = 12 | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 11 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | Urinary System = 2 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.3 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.9 | |
| | | | | Cadmium (Diet) | MET | RME only | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Adult Resident, C/S | Future: 57 | Dermal (DM) = 5 | Arsenic | MET | RME+CTE | NA | 0.8 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 4 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Gastrointestinal (GI) = 1 | Iron | MET | RME+CTE | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Beryllium | MET | RME only | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Iron | MET | RME+CTE | NA | 0.6 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 16 | Aluminum | MET | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.01 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 12 | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 11 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Urinary System = 1 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Outdoor Worker, C/S | Future: 3 | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Total Soil |
| CTE | Indoor/Outdoor Commercial Worker, C/S | Future: 5 | Respiratory System (RS) = 1 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | Immune System (IM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Nervous System (NV) = 2 | Xylenes, Total | VOC | RME+CTE | NA | 3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Construction Worker, C/S | Future: 7 | Hematological (HM) = 1 | Benzene | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 4 | Manganese | MET | RME+CTE | NA | 0.1 | Inhalation of Particles in Outdoor Air from Total Soil (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Respiratory System (RS) = 5 | Naphthalene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Onsite Adult Resident, C/S | Future: 43 | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.8 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 0.003 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Dermal (DM) = 4 | Arsenic | MET | RME+CTE | NA | 0.6 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 3 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.8 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| CTE | Onsite Child Resident, C/S | Future: 42 | Dermal (DM) = 2 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Benzo(a)pyrene | SVOC | RME+CTE | NA | 0.4 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Gastrointestinal (GI) = 1 | Copper | MET | RME+CTE | NA | 0.3 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Iron | MET | RME+CTE | NA | 0.3 | |
| | | | | Beryllium | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Iron | MET | RME+CTE | NA | 0.3 | |
| | | | Immune System (IM) = 17 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Manganese | MET | RME+CTE | NA | 0.1 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Onsite Child Resident, C/S | Future: 42 | Nervous System (NV) = 15 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 2 | 1,1,2-Trichloroethane | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Other (OT) = 1 | Antimony | MET | RME+CTE | NA | 0.9 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Nickel | MET | RME+CTE | NA | 0.1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.2 | |
| **Northern/Western Exposure Area** | | | | | | | | | |
| RME | Indoor/Outdoor Commercial Worker, N/W | Future: 8 | Immune System (IM) = 4 | Benzene | VOC | RME+CTE | NA | 4 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME only | NA | 0.2 | |
| | | | Nervous System (NV) = 3 | Naphthalene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 3 | |
| RME | Construction Worker, N/W | Future: 11 | Hematological (HM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 8 | Isopropylbenzene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| | | | | Toluene | VOC | RME only | NA | 0.1 | |
| | | | | Mercury | MET | RME only | NA | 0.1 | |
| | | | Other (OT) = 1 | Xylenes, Total | VOC | RME only | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Respiratory System (RS) = 7 | Isopropylbenzene | VOC | RME only | NA | 0.2 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 7 | |
| RME | Onsite Child Resident, N/W | Future: 54 | Cardiovascular System (CV) = 1 | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Dermal (DM) = 8 | Arsenic | MET | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 7 | |
| | | | | Vanadium | MET | RME only | NA | 0.1 | |
| | | | Developmental System (DV) = 2 | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Cyclohexane | VOC | RME+CTE | NA | 0.5 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Endocrine (EN) = 1 | Isopropylbenzene | VOC | RME only | NA | 0.1 | |
| | | | | Cobalt | MET | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Gastrointestinal (GI) = 1 | Beryllium | MET | RME only | NA | 0.2 | |
| | | | | Iron | MET | RME only | NA | 1 | |
| | | | Immune System (IM) = 20 | Benzene | VOC | RME+CTE | NA | 4 | |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| RME | Onsite Child Resident, N/W | Future: 54 | Immune System (IM) = 20 | Trichloroethene | VOC | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 17 | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Aluminum | MET | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 2 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Reproductive System (RP) = 1 | 2,3,7,8-TCDD TEQ | DIOX/FUR | RME only | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | Respiratory System (RS) = 1 | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.5 | Ingestion and Dermal Contact with Groundwater |
| | | | Urinary System = 2 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.2 | |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.3 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.9 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| RME | Onsite Adult Resident, N/W | Future: 45 | Dermal (DM) = 5 | Arsenic | MET | RME+CTE | NA | 0.8 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 4 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 2 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 16 | Aluminum | MET | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 1 | |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 0.01 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 1 | 2-Methylnaphthalene | SVOC | RME only | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.01 | Inhalation of Vapors in Indoor Air from Groundwater (Shower/Bath Vapors) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Urinary System = 1 | cis-1,2-Dichloroethene | VOC | RME only | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | 1,1'-Biphenyl | SVOC | RME only | NA | 0.2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |

**Table 6-4**
**Chemicals with Target Organ Hazard Quotient Results Equal to or Above the Target Threshold of 0.1**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | Scenario Evaluaton COC | Chemical-Specific Hazard Quotients Equal to or Above 0.1 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Current | Future [a] | |
| CTE | Indoor/Outdoor Commercial Worker, N/W | Future: 4 | Immune System (IM) = 2 | Benzene | VOC | RME+CTE | NA | 2 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | Nervous System (NV) = 2 | Xylenes, Total | VOC | RME+CTE | NA | 1 | |
| CTE | Construction Worker, N/W | Future: 6 | Hematological (HM) = 1 | Benzene | VOC | RME+CTE | NA | 1 | Inhalation of Vapors in Outdoor Air from Groundwater (Trench) |
| | | | Nervous System (NV) = 4 | Naphthalene | VOC | RME+CTE | NA | 4 | |
| | | | Respiratory System (RS) = 4 | Naphthalene | VOC | RME+CTE | NA | 4 | |
| CTE | Onsite Child Resident, N/W | Future: 38 | Dermal (DM) = 2 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 17 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |
| | | | Respiratory System (RS) = 1 | 2-Methylnaphthalene | SVOC | RME+CTE | NA | 0.3 | Ingestion and Dermal Contact with Groundwater |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| CTE | Onsite Adult Resident, N/W | Future: 42 | Dermal (DM) = 4 | Arsenic | MET | RME+CTE | NA | 0.4 | Ingestion and Dermal Contact with Groundwater |
| | | | | Thallium | MET | RME+CTE | NA | 2 | |
| | | | Developmental System (DV) = 2 | Cyclohexane | VOC | RME+CTE | NA | 0.5 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Ethylbenzene | VOC | RME+CTE | NA | 0.4 | |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Immune System (IM) = 18 | Benzene | VOC | RME+CTE | NA | 1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | RME+CTE | NA | 15 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Trichloroethene | VOC | RME+CTE | NA | 0.7 | |
| | | | Nervous System (NV) = 15 | Aluminum | MET | RME+CTE | NA | 0.1 | Ingestion and Dermal Contact with Groundwater |
| | | | | Manganese | MET | RME+CTE | NA | 0.5 | |
| | | | | 1,2-Dichloroethane | VOC | RME+CTE | NA | 0.1 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Naphthalene | VOC | RME+CTE | NA | 0.7 | |
| | | | | Tetrachloroethene | VOC | RME+CTE | NA | 0.2 | |
| | | | | Toluene | VOC | RME+CTE | NA | 0.5 | |
| | | | | Xylenes, Total | VOC | RME+CTE | NA | 12 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Mercury | MET | RME+CTE | NA | 0.3 | |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

**Table 7-1**
**2,3,7,8-TCDD TEQ Sensitivity Analysis Cancer Risk Results**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | 2,3,7,8-TCDD TEQ Cancer Risk Estimates NDs = 1/2 MDL | | 2,3,7,8-TCDD TEQ Cancer Risk Estimates NDs = 0 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Current | Future | Current | Future | |
| **Central/Southern Exposure Area** | | | | | | | | | | |
| RME | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 6E-04 | 2,3,7,8-TCDD TEQ | DIOX/FUR | 3E-06 | NA | 3E-06 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | Future: 3E-04 | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 3E-06 | NA | 4E-07 | Ingestion and Dermal Contact with Total Soil |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 3E-05 | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | Future: 3E-03 | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 5E-06 | NA | 7E-07 | Incidental Ingestion and Dermal Contact with Total Soil |
| **Northern/Western Exposure Area** | | | | | | | | | | |
| RME | Future | Onsite Lifetime Resident, N/W | Future: 3E-03 | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 3E-05 | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

**Table 7-2**
**2,3,7,8-TCDD TEQ Sensitivity Analysis Target Organ Hazard Quotient Results**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario | Cumulative Non-Cancer Hazard Estimate Above 1 | Target Organ-Specific HI Equal to or Above 1 | Contributing Constituent of Potential Concern | Chemical Class | 2,3,7,8-TCDD TEQ Hazard Quotients NDs = 1/2 MDL | | 2,3,7,8-TCDD TEQ Hazard Quotients NDs = 0 | | Exposure Pathway of Potential Concern [b] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Current | Future [a] | Current | Future [a] | |
| **Central/Southern Exposure Area** | | | | | | | | | | |
| **RME** | Onsite Child Resident, C/S | Future: 75 | Reproductive System (RP) = 2 | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 0.5 | NA | 0.07 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 1 | NA | 0.07 | Ingestion and Dermal Contact with Groundwater |
| **Northern/Western Exposure Area** | | | | | | | | | | |
| **RME** | Onsite Child Resident, N/W | Future: 54 | Reproductive System (RP) = 1 | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 1 | NA | 0.07 | Ingestion and Dermal Contact with Groundwater |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

**Table 7-3**
**Summary of Chemicals of Potential Concern Below Background Threshold Values**
**Human Health Risk Assessment**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Chemical | CASRN | Exposure Medium and Pathways | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Surface Soil Central AOC | Surface Soil Northern AOC | Surface Soil Southern AOC | Surface Soil Western AOC | Subsurface Soil Central AOC | Subsurface Soil Northern AOC | Subsurface Soil Southern AOC | Groundwater Surficial Aquifer |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | |
| Benzo(a)pyrene | 50-32-8 | X | -- | Below BTV | -- | X | -- | X | X |
| **Metals (Total)** | | | | | | | | | |
| Aluminum | 7429-90-5 | X | X | X | Below BTV | Below BTV | -- | X | X |
| Antimony | 7440-36-0 | -- | -- | X | -- | X | -- | X | Below BTV |
| Arsenic | 7440-38-2 | Below BTV | Below BTV | Below BTV | Below BTV | X | Below BTV | X | X |
| Chromium | 7440-47-3 | X | Below BTV | X | Below BTV | X | Below BTV | X | X |
| Cobalt | 7440-48-4 | X | Below BTV | X | Below BTV | X | -- | X | X |
| Iron | 7439-89-6 | X | Below BTV | X | Below BTV | X | -- | X | X |
| Manganese | 7439-96-5 | Below BTV | -- | X | -- | -- | -- | X | X |
| Thallium | 7440-28-0 | Below BTV | Below BTV | Below BTV | Below BTV | X (ND) | X (ND) | X (ND) | X |

**Notes:**

CASRN = chemical abstract service registry number; NA = not applicable; GW = groundwater; SVOC = semi-volatile organic compound; COPC = Chemical of Potential Concern; BTV = Background Threshold Value; '-- = Chemical is not a COPC; 'X = chemical is a medium-specific COPC and is quantified in the HHRA

X (ND) = indicates chemical is non-detect (ND) but the detection limit analysis identified it as a COPC.

Below BTV = COPC with concentrations below BTVs, COPC was excluded.

- BTVs and COPC concentrations are presented in the BTV screening tables (Table 2-1.BTV through 2-8.BTV in Attachment 2)

**Table 7-4**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment - Post BTV Evaluation**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [(b)] |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Current | Future | |
| **Central/Southern Exposure Area** | | | | | | | | |
| RME | Current/Future | Lifetime Outdoor Recreator, C/S | Current: 6E-04 | Benzo(a)pyrene | SVOC | 3E-06 | NA | Incidental Ingestion and Dermal Contact with Surface Soil |
| | | | | Dibenz(a,h)anthracene | SVOC | 2E-06 | NA | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | 3E-06 | NA | |
| | | | | Arsenic | MET | 4E-06 | NA | |
| | | | | Chromium, total | MET | 6E-04 | NA | |
| | | | Future: 3E-04 | 1,1,2-Trichloroethane | VOC | NA | 1E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | NA | 3E-06 | |
| | | | | Benzo(a)pyrene | SVOC | NA | 1E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | NA | 3E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | NA | 2E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | NA | 2E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 3E-06 | |
| | | | | Arsenic | MET | NA | 8E-06 | |
| | | | | Chromium, total | MET | NA | 2E-04 | |
| RME | Future | Indoor/Outdoor Commercial Worker, C/S | Future: 4E-04 | Benzo(a)pyrene | SVOC | NA | 1E-05 | Ingestion and Dermal Contact with Total Soil |
| | | | | Arsenic | MET | NA | 3E-06 | |
| | | | | Chromium, Total | MET | NA | 2E-05 | |
| | | | | 1,1,2-Trichloroethane | VOC | NA | 3E-06 | Inhalation of Vapors in Outdoor Air from Total Soil |
| | | | | 1,2-Dichloroethane | VOC | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | NA | 9E-05 | |
| | | | | Naphthalene | VOC | NA | 6E-06 | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | 1,2-Dichloroethane | VOC | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | NA | 8E-05 | |
| | | | | Naphthalene | VOC | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 3E-05 | |
| | | | | Arsenic | MET | NA | 2E-04 | |
| | | | | Chromium, Total | MET | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | NA | 1E-03 | |
| | | | | Ethylbenzene | VOC | NA | 4E-04 | |
| | | | | Naphthalene | VOC | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | NA | 3E-06 | |

**Table 7-4**
**Chemicals with Cancer Risk Estimates Equal to or Above the Target Threshold of 1E-06**
**Human Health Risk Assessment - Post BTV Evaluation**
**Project 15 CDL, Wallops Flight Facility, Wallops Island, Virginia**

| Exposure | Scenario Timeframe | Scenario | Cumulative Cancer Risk Estimate Above 1E-04 | Contributing Chemical of Potential Concern | Chemical Class | Constituent-Specific Cancer Risk Estimates Above $1\times10^{-6}$ (1E-06) | | Exposure Pathway of Potential Concern [(b)] |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Current | Future | |
| RME | Future | Onsite Lifetime Resident, C/S | Future: 3E-03 | 1,1,2-Trichloroethane | VOC | NA | 2E-06 | Incidental Ingestion and Dermal Contact with Total Soil |
| | | | | Benzo(a)anthracene | SVOC | NA | 5E-06 | |
| | | | | Benzo(a)pyrene | SVOC | NA | 2E-04 | |
| | | | | Benzo(b)fluoranthene | SVOC | NA | 6E-06 | |
| | | | | Dibenz(a,h)anthracene | SVOC | NA | 3E-06 | |
| | | | | Indeno(1,2,3-cd)pyrene | SVOC | NA | 4E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 5E-06 | |
| | | | | Arsenic | MET | NA | 1E-05 | |
| | | | | Chromium, Total | MET | NA | 4E-04 | |
| **Northern/Western Exposure Area** | | | | | | | | |
| RME | Future | Indoor/Outdoor Commercial Worker, N/W | Future: 4E-04 | 1,2-Dichloroethane | VOC | NA | 2E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | NA | 3E-04 | |
| | | | | Ethylbenzene | VOC | NA | 9E-05 | |
| | | | | Naphthalene | VOC | NA | 6E-06 | |
| | | | | Chromium, Total | MET | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |
| RME | Future | Onsite Lifetime Resident, N/W | Future: 3E-03 | 1,2-Dichloroethane | VOC | NA | 2E-06 | Ingestion and Dermal Contact with Groundwater |
| | | | | Benzene | VOC | NA | 2E-04 | |
| | | | | Ethylbenzene | VOC | NA | 8E-05 | |
| | | | | Naphthalene | VOC | NA | 1E-04 | |
| | | | | Benzo(a)pyrene | SVOC | NA | 5E-06 | |
| | | | | 2,3,7,8-TCDD TEQ | DIOX/FUR | NA | 3E-05 | |
| | | | | Arsenic | MET | NA | 2E-04 | |
| | | | | Chromium, Total | MET | NA | 4E-04 | |
| | | | | 1,2-Dichloroethane | VOC | NA | 8E-06 | Inhalation of Vapors in Indoor Air from Groundwater (VI) |
| | | | | Benzene | VOC | NA | 1E-03 | |
| | | | | Ethylbenzene | VOC | NA | 4E-04 | |
| | | | | Naphthalene | VOC | NA | 3E-05 | |
| | | | | Trichloroethene | VOC | NA | 3E-06 | |
| | | | | Arsenic | MET | NA | 4E-06 | Ingestion and Dermal Contact with Total Soil |
| | | | | Chromium, Total | MET | NA | 7E-05 | |

**Notes:**

2,3,7,8-TCDD TEQ = 2,3,7,8- Tetrachlorodibenzo-p-dioxin Toxicity Equivalence; AOC = Area of Concern; BTV = Background Threshold Value; C/S = Central/Southern AOC; CTE = Central Tendency Exposure; DIOX/FUR = Dioxins and Furans; MET = Metals; NA = Not Applicable; N/W = Northern/Western AOC; RME = Reasonable Maximum Exposure; SVOC = Semi-Volatile Organic Compound; VI = Vapor Intrusion; VOC = Volatile Organic Compound

(a) The main difference between the current and future scenarios is soil exposure medium; the current receptors are exposed to surface soil while the future receptors are exposed to total soil.

(b) All groundwater pathways involve the Surficial Aquifer.

= COC below BTVs

# Attachments

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| | |
|---|---|
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|---|---|
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**ATTACHMENT 3: HUMAN HEALTH EXPOSURE ASSESSMENT AND ENVIRONMENTAL TRANSPORT AND FATE MODELS**

**Values Used for Daily Intake and Dermally Absorbed Dose Calculations: Reasonable Maximum Exposure**


| | |
|---|---|
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| | |
|---|---|
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| | |
|---|---|
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|---|---|
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|---|---|
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| | |
|---|---|
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|---|---|
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| | |
|---|---|
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| | |
|---|---|
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| Table 7-2.RME | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-3.RME | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-4.RME | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-5.RME | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-6.RME | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-7.RME | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-8.RME | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
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| Table 7-11.RME | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |

| | |
|---|---|
| Table 7-12.RME | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
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| Table 7-14.RME | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-15.RME | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-16.RME | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-17.RME | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-18.RME | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-19.RME | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
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| Table 7-21.RME | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-22.RME | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-23.RME | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-24.RME | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-25.RME | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 7-26.RME | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-27.RME | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-28.RME | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-29.RME | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 7-30.RME | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
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| Table 7-32.RME | Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Reasonable Maximum Exposure (Downgradient Estuarine) |

| | |
|---|---|
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**Summary of Chemical Cancer Risks and Non-Cancer Hazards for Constituents of Interest: Reasonable Maximum Exposure**


| | |
|---|---|
| Table 9-1.RME | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-2.RME | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-3.RME | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-4.RME | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-5.RME | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-6.RME | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-7.RME | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-8.RME | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-9.RME | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-10.RME | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-11.RME | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-12.RME | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-13.RME | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-14.RME | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-15.RME | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Central/Southern) |

| | |
|---|---|
| Table 9-16.RME | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-17.RME | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-18.RME | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-19.RME | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-20.RME | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-21.RME | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-22.RME | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-23.RME | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-24.RME | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-25.RME | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Central/Southern) |
| Table 9-26.RME | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-27.RME | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-28.RME | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-29.RME | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-30.RME | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Reasonable Maximum Exposure (Northern/Western) |
| Table 9-31.RME | Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Reasonable Maximum Exposure (Downgradient Estuarine) |
| Table 9-32.RME | Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Reasonable Maximum Exposure (Downgradient Estuarine) |
| Table 9-33.RME | Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Reasonable Maximum Exposure (Downgradient Estuarine) |
| Table 9-34.RME | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Reasonable Maximum Exposure (Downgradient Estuarine) |
| Table 9-35.RME | Current/Future On-Site Outdoor Maintenance Worker - Sediment; Reasonable Maximum Exposure (Upgradient Drainage) |
| Table 9-36.RME | Current/Future On-Site Trespasser (Teen) - Sediment; Reasonable Maximum Exposure (Upgradient Drainage) |
| Table 9-37.RME | Current/Future On-Site Outdoor Recreator (Child) - Sediment; Reasonable Maximum Exposure (Upgradient Drainage) |

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|---|---|
| Table 9-38.RME | Current/Future On-Site Outdoor Recreator (Adult) - Sediment; Reasonable Maximum Exposure (Upgradient Drainage) |
| Table 9-39.RME | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment; Reasonable Maximum Exposure (Upgradient Drainage) |


**Calculation of Chemical Cancer Risks and Non-Cancer Hazards: Central Tendency Exposure**


| | |
|---|---|
| Table 7-1.CTE | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-2.CTE | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-3.CTE | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-4.CTE | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-5.CTE | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-6.CTE | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-7.CTE | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-8.CTE | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-9.CTE | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-10.CTE | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-11.CTE | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 7-12.CTE | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-13.CTE | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 7-14.CTE | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 7-15.CTE | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 7-16.CTE | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 7-17.CTE | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-18.CTE | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 7-19.CTE | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 7-20.CTE | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |

| | |
|---|---|
| Table 7-21.CTE | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-22.CTE | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-23.CTE | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-24.CTE | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-25.CTE | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 7-26.CTE | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-27.CTE | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-28.CTE | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-29.CTE | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-30.CTE | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 7-31.CTE | Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 7-32.CTE | Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 7-33.CTE | Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 7-34.CTE | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 7-35.CTE | Current/Future On-Site Outdoor Maintenance Worker - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 7-36.CTE | Current/Future On-Site Trespasser (Teen) - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 7-37.CTE | Current/Future On-Site Outdoor Recreator (Child) - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 7-38.CTE | Current/Future On-Site Outdoor Recreator (Adult) - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 7-39.CTE | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment; Central Tendency Exposure (Upgradient Drainage) |


**Summary of Chemical Cancer Risks and Non-Cancer Hazards for Constituents of Interest: Central Tendency Exposure**


| | |
|---|---|
| Table 9-1.CTE | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-2.CTE | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-3.CTE | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-4.CTE | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-5.CTE | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |

| | |
|---|---|
| Table 9-6.CTE | Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-7.CTE | Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-8.CTE | Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-9.CTE | Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-10.CTE | Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-11.CTE | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 9-12.CTE | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-13.CTE | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 9-14.CTE | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 9-15.CTE | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Central/Southern) |
| Table 9-16.CTE | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 9-17.CTE | Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-18.CTE | Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 9-19.CTE | Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 9-20.CTE | Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion); Central Tendency Exposure (Northern/Western) |
| Table 9-21.CTE | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-22.CTE | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-23.CTE | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-24.CTE | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-25.CTE | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Central/Southern) |
| Table 9-26.CTE | Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-27.CTE | Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-28.CTE | Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |

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|---|---|
| Table 9-29.CTE | Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-30.CTE | Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air); Central Tendency Exposure (Northern/Western) |
| Table 9-31.CTE | Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 9-32.CTE | Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 9-33.CTE | Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 9-34.CTE | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue; Central Tendency Exposure (Downgradient Estuarine) |
| Table 9-35.CTE | Current/Future On-Site Outdoor Maintenance Worker - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 9-36.CTE | Current/Future On-Site Trespasser (Teen) - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 9-37.CTE | Current/Future On-Site Outdoor Recreator (Child) - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 9-38.CTE | Current/Future On-Site Outdoor Recreator (Adult) - Sediment; Central Tendency Exposure (Upgradient Drainage) |
| Table 9-39.CTE | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment; Central Tendency Exposure (Upgradient Drainage) |


**ATTACHMENT 6: Data Sensitivity Analysis**

**Calculation of Chemical Cancer Risks and Non-Cancer Hazards: Data Sensitivity Analysis**


| | |
|---|---|
| Table 7-1.DSA | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-2.DSA | Future On-Site Construction Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-3.DSA | Future On-Site Hypothetical Resident (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-4.DSA | Future On-Site Hypothetical Resident (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-5.DSA | Future On-Site Hypothetical Resident (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-6.DSA | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-7.DSA | Future On-Site Construction Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-8.DSA | Future On-Site Hypothetical Resident (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-9.DSA | Future On-Site Hypothetical Resident (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-10.DSA | Future On-Site Hypothetical Resident (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-11.DSA | Future On-Site Outdoor Maintenance Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-12.DSA | Future On-Site Trespasser (Teen) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |

| | |
|---|---|
| Table 7-13.DSA | Future On-Site Outdoor Recreator (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-14.DSA | Future On-Site Outdoor Recreator (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-15.DSA | Future On-Site Outdoor Recreator (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 7-16.DSA | Future On-Site Outdoor Maintenance Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-17.DSA | Future On-Site Trespasser (Teen) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-18.DSA | Future On-Site Outdoor Recreator (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-19.DSA | Future On-Site Outdoor Recreator (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-20.DSA | Future On-Site Outdoor Recreator (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 7-21.DSA | Current/Future On-Site Trespasser (Teen) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 7-22.DSA | Current/Future On-Site Outdoor Recreator (Child) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 7-23.DSA | Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 7-24.DSA | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 7-25.DSA | Current/Future Off-Site Resident (Child) - Groundwater (Potable Use); Reasonable Maximum Exposure (Yorktown Aquifer) |
| Table 7-26.DSA | Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use); Reasonable Maximum Exposure (Yorktown Aquifer) |
| Table 7-27.DSA | Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use); Reasonable Maximum Exposure (Yorktown Aquifer) |


**Summary of Chemical Cancer Risks and Non-Cancer Hazards for Constituents of Interest: Reasonable Maximum Exposure**


| | |
|---|---|
| Table 9-1.DSA | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-2.DSA | Future On-Site Construction Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-3.DSA | Future On-Site Hypothetical Resident (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-4.DSA | Future On-Site Hypothetical Resident (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-5.DSA | Future On-Site Hypothetical Resident (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-6.DSA | Future On-Site Indoor/Outdoor Commercial Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-7.DSA | Future On-Site Construction Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-8.DSA | Future On-Site Hypothetical Resident (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-9.DSA | Future On-Site Hypothetical Resident (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-10.DSA | Future On-Site Hypothetical Resident (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-11.DSA | Future On-Site Outdoor Maintenance Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |

| | |
|---|---|
| Table 9-12.DSA | Future On-Site Trespasser (Teen) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-13.DSA | Future On-Site Outdoor Recreator (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-14.DSA | Future On-Site Outdoor Recreator (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-15.DSA | Future On-Site Outdoor Recreator (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern) |
| Table 9-16.DSA | Future On-Site Outdoor Maintenance Worker - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-17.DSA | Future On-Site Trespasser (Teen) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-18.DSA | Future On-Site Outdoor Recreator (Child) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-19.DSA | Future On-Site Outdoor Recreator (Adult) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-20.DSA | Future On-Site Outdoor Recreator (Lifetime) - Total Soil; Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western) |
| Table 9-21.DSA | Current/Future On-Site Trespasser (Teen) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 9-22.DSA | Current/Future On-Site Outdoor Recreator (Child) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 9-23.DSA | Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 9-24.DSA | Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Surface Water; Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine) |
| Table 9-25.DSA | Current/Future Off-Site Resident (Child) - Groundwater (Potable Use); Reasonable Maximum Exposure (Yorktown Aquifer) |
| Table 9-26.DSA | Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use); Reasonable Maximum Exposure (Yorktown Aquifer) |
| Table 9-27.DSA | Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use); Reasonable Maximum Exposure (Yorktown Aquifer) |

# Attachment 1

## Human Health Risk Assessment Data Sets

Table 1-2
Samples Used Within HHRA - Summary
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility
Wallops Island, Virginia

| Medium | Exposure Area | Sample Location | Vertical Unit | Sample Name | Date | Depth (ft. bgs)[1] | Type | Result Count | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | VOC | SVOC | PEST | PCB | DIOX/FUR | CYANIDE | TOT MET | TOTAL |
| SD | Upgradient Drainage | SD-9 | All | SD-9 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Upgradient Drainage | SD-10 | All | SD-10 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-2 | All | SD-2 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-3 | All | SD-3 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-4 | All | SD-4 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-4D | All | SD-4D | 5/2/2007 | N/A | FD | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-5 | All | SD-5 | 4/30/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-6 | All | SD-6 | 4/30/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-7 | All | SD-7 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD-8 | All | SD-8 | 5/2/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SD | Downgradient Estuarine | SD13 | All | CDL-SD13-00-001 | 8/23/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SD | Downgradient Estuarine | SD14 | All | CDL-SD14-00-001 | 8/23/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SD | Downgradient Estuarine | SD15 | All | CDL-SD15-00-001 | 8/23/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SD | Downgradient Estuarine | SD16 | All | CDL-SD16-00-001 | 8/30/2016 | 0 – 0.5 | N | 50 | 62 | 0 | 0 | 18 | 0 | 23 | 153 |
| SD | Downgradient Estuarine | SD16 | All | CDL-SD16-01-001 | 8/30/2016 | 0 – 0.5 | FD | 50 | 62 | 0 | 0 | 18 | 0 | 23 | 153 |
| SD | Downgradient Estuarine | SD17 | All | CDL-SD17-00-001 | 8/30/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SD | Downgradient Estuarine | SD17 | All | CDL-SD17-01-001 | 8/30/2016 | 0 – 0.5 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SD | Downgradient Estuarine | SD18 | All | CDL-SD18-00-001 | 8/30/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 22 | 153 |
| SD | Downgradient Estuarine | SD18 | All | CDL-SD18-01-001 | 8/30/2016 | 0 – 0.5 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 22 | 153 |
| SD | Downgradient Estuarine | SD19 | All | CDL-SD19-00-001 | 8/29/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 22 | 153 |
| SD | Downgradient Estuarine | SD21 | All | CDL-SD21-00-001 | 8/26/2016 | 0 – 0.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SO | Central AOC | DPT1 | Subsurface Soil | CDL-DPS01-00-027 | 7/21/2015 | 13 – 13.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | DPT2 | Subsurface Soil | CDL-DPS02-00-020 | 7/22/2015 | 9.5 – 10 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | DPT3 | Subsurface Soil | CDL-DPS03-00-010 | 7/22/2015 | 4.5 – 5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | DPT5 | Subsurface Soil | CDL-DPS05-00-026 | 7/24/2015 | 12.5 – 13 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | DPT5 | Subsurface Soil | CDL-DPS05-01-026 | 7/24/2015 | 12.5 – 13 | FD | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | SB-4A | Surface Soil | SB-4A | 4/18/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | SB-4A | Surface Soil | SB-4AD | 4/18/2007 | 0 – 0.5 | FD | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | SB-4B | Surface Soil | SB-4B | 4/18/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | SB-4C | Subsurface Soil | SB-4C | 4/18/2007 | 9 – 10 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | SB-5A | Surface Soil | SB-5A | 4/18/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | SB-5B | Surface Soil | SB-5B | 4/18/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | TP11B | Subsurface Soil | CDL-TP11B-00-12 | 5/28/2015 | 11 – 12 | N | 4 | 15 | 0 | 0 | 0 | 0 | 23 | 42 |
| SO | Central AOC | TP11C | Subsurface Soil | CDL-TP11C-00-12 | 5/28/2015 | 11 – 12 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP12C | Subsurface Soil | CDL-TP12C-00-009 | 6/2/2015 | 4.5 – 5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP13B | Subsurface Soil | CDL-TP13B-00-010 | 6/4/2015 | 4.5 – 5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP13C | Subsurface Soil | CDL-TP13C-00-006 | 6/4/2015 | 2.5 – 3 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP-1A (BURN AREA) | Surface Soil | TP-1A (BURN AREA) | 4/9/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | TP-1B (BURN AREA) | Surface Soil | TP-1B (BURN AREA) | 4/9/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | TP-1C (BURN AREA) | Subsurface Soil | TP-1C (BURN AREA) | 4/9/2007 | 2 – 8.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Central AOC | TP24A | Subsurface Soil | CDL-TP24A-00-012 | 6/10/2015 | 5.5 – 6 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP24A | Subsurface Soil | CDL-TP24A-01-012 | 6/10/2015 | 5.5 – 6 | FD | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP25C | Subsurface Soil | CDL-TP25C-00-034 | 5/12/2016 | 16.5 – 17 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP26B | Subsurface Soil | CDL-TP26B-00-010 | 5/11/2016 | 4 – 4.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Central AOC | TP-6A | Surface Soil | TP-6A | 4/10/2007 | 0 – 0.5 | N | 52 | 63 | 21 | 7 | 0 | 1 | 23 | 167 |
| SO | Central AOC | TP-6B | Surface Soil | TP-6B | 4/10/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Northern AOC | DPT9 | Subsurface Soil | CDL-DPS09-00-035 | 7/24/2015 | 17 – 17.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |

Table 1-2
Samples Used Within HHRA - Summary
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility
Wallops Island, Virginia

| Medium | Exposure Area | Sample Location | Vertical Unit | Sample Name | Date | Depth (ft. bgs)[1] | Type | Result Count | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | VOC | SVOC | PEST | PCB | DIOX/FUR | CYANIDE | TOT MET | TOTAL |
| SO | Northern AOC | DPT9 | Subsurface Soil | CDL-DPS09-01-035 | 7/24/2015 | 17 – 17.5 | FD | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Northern AOC | DPT10 | Subsurface Soil | CDL-DPS10-00-016 | 7/21/2015 | 7.5 – 8 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Northern AOC | SB-6A | Surface Soil | SB-6A | 4/18/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Northern AOC | SB-6B | Surface Soil | SB-6B | 4/18/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Northern AOC | TP-5A | Surface Soil | TP-5A | 4/9/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Northern AOC | TP-5B | Surface Soil | TP-5B | 4/9/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | DPT4 | Subsurface Soil | CDL-DPS04-00-15 | 7/23/2015 | 7 – 7.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | DPT6 | Subsurface Soil | CDL-DPS06-00-014 | 7/22/2015 | 6.5 – 7 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | DPT7 | Surface Soil | CDL-DPS07-00-002 | 7/27/2015 | 0.5 – 1 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | DPT8 | Subsurface Soil | CDL-DPS08-00-010 | 7/23/2015 | 4.5 – 5 | N | 50 | 62 | 0 | 0 | 0 | 0 | 23 | 135 |
| SO | Southern AOC | DPT8 | Subsurface Soil | CDL-DPS08-01-010 | 7/23/2015 | 4.5 – 5 | FD | 50 | 62 | 0 | 0 | 0 | 0 | 23 | 135 |
| SO | Southern AOC | DPT11 | Subsurface Soil | CDL-DPS11-00-019 | 7/27/2015 | 9 – 9.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | SB-3A | Surface Soil | SB-3A | 4/18/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | SB-3B | Surface Soil | SB-3B | 4/18/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-2A | Surface Soil | TP-2A | 4/9/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-2B | Surface Soil | TP-2B | 4/9/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-3A (BURN AREA) | Surface Soil | TP-3A (BURN AREA) | 4/9/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-3B (BURN AREA) | Surface Soil | TP-3B (BURN AREA) | 4/9/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-3C (BURN AREA) | Subsurface Soil | TP-3C (BURN AREA) | 4/9/2007 | 4 – 5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-3C (BURN AREA) | Subsurface Soil | TP-3C-D (BURN AREA) | 4/9/2007 | 4 – 5 | FD | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-4A (BURN AREA) | Surface Soil | TP-4A (BURN AREA) | 4/9/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-4B (BURN AREA) | Surface Soil | TP-4B (BURN AREA) | 4/9/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-7A (BURN AREA) | Surface Soil | TP-7A (BURN AREA) | 4/10/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP-7B (BURN AREA) | Surface Soil | TP-7B (BURN AREA) | 4/10/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Southern AOC | TP18B | Subsurface Soil | CDL-TP18B-00-008 | 6/9/2015 | 3.5 – 4 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | TP19A | Subsurface Soil | CDL-TP19A-00-009 | 6/9/2015 | 4 – 4.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | TP20B | Subsurface Soil | CDL-TP20B-00-010 | 6/8/2015 | 4 – 4.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SO | Southern AOC | TP20B | Subsurface Soil | CDL-TP20B-01-010 | 6/8/2015 | 4 – 4.5 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SO | Southern AOC | TP21A | Subsurface Soil | CDL-TP21A-00-007 | 6/9/2015 | 3 – 3.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | TP22B | Surface Soil | CDL-TP22B-00-004 | 6/5/2015 | 1.5 – 2 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| SO | Southern AOC | TP27A | Surface Soil | CDL-TP27A-00-004 | 5/10/2016 | 1.5 – 1.5 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SO | Southern AOC | TP27A | Surface Soil | CDL-TP27A-01-004 | 5/10/2016 | 1.5 – 1.5 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| SO | Western AOC | SB-2A | Surface Soil | SB-2A | 4/17/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Western AOC | SB-2B | Surface Soil | SB-2B | 4/17/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Western AOC | TP-8A | Surface Soil | TP-8A | 4/10/2007 | 0 – 0.5 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SO | Western AOC | TP-8B | Surface Soil | TP-8B | 4/9/2007 | 0.5 – 2 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-02 | All | SW-2 | 5/1/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-02 | All | SW-02 | 12/19/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-03 | All | SW-3 | 5/1/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-03 | All | SW-03 | 12/19/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-04 | All | SW-4 | 5/1/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-04 | All | SW-4D | 5/1/2007 | N/A | FD | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| SW | Downgradient Estuarine | SW-04 | All | SW-04 | 12/19/2007 | N/A | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Central AOC | DPW1 | Surficial Aquifer | CDL-DPW01-00-3039 | 7/21/2015 | 14.5 – 19.5 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW2 | Surficial Aquifer | CDL-DPW02-00-2130 | 7/22/2015 | 10 – 15 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW3 | Surficial Aquifer | CDL-DPW03-00-1120 | 7/22/2015 | 5 – 10 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW3 | Surficial Aquifer | CDL-DPW03-01-1120 | 7/22/2015 | 5 – 10 | FD | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |

Table 1-2
Samples Used Within HHRA - Summary
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility
Wallops Island, Virginia

| Medium | Exposure Area | Sample Location | Vertical Unit | Sample Name | Date | Depth (ft. bgs)[1] | Type | Result Count | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | VOC | SVOC | PEST | PCB | DIOX/FUR | CYANIDE | TOT MET | TOTAL |
| WG | Central AOC | DPW5 | Surficial Aquifer | CDL-DPW05-00-2736 | 7/24/2015 | 13 – 18 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW12 | Surficial Aquifer | CDL-DPW12-00-2332 | 5/6/2016 | 11 – 16 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW13 | Surficial Aquifer | CDL-DPW13-00-3544 | 5/4/2016 | 17 – 22 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW14 | Surficial Aquifer | CDL-DPW14-00-3140 | 5/5/2016 | 10 – 15 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DPW14 | Surficial Aquifer | CDL-DPW14-01-3140 | 5/5/2016 | 10 – 15 | FD | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Central AOC | DTW1 | Surficial Aquifer | CDL-DTW1-00-119128 | 8/19/2016 | 59 – 64 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | DTW1 | Surficial Aquifer | CDL-DTW1-01-119128 | 8/19/2016 | 59 – 64 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | DTW2 | Surficial Aquifer | CDL-DTW2-00-107116 | 8/26/2016 | 52 – 57 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | MW-04 | Surficial Aquifer | MW-4 | 5/2/2007 | 4 – 14 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Central AOC | MW-04 | Surficial Aquifer | MW-4D | 5/2/2007 | 4 – 14 | FD | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Central AOC | MW-04 | Surficial Aquifer | MW-04 | 12/18/2007 | 4 – 14 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Central AOC | MW-04 | Surficial Aquifer | CDL-MW4-00-009028 | 5/13/2016 | 4 – 14 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | MW-04 | Surficial Aquifer | CDL-MW4-01-009028 | 5/13/2016 | 4 – 14 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | MW-04 | Surficial Aquifer | CDL-MW4-00-009028-02 | 11/15/2016 | 4 – 14 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | MW-04 | Surficial Aquifer | CDL-MW4-01-009028-02 | 11/15/2016 | 4 – 14 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | MW-05 | Surficial Aquifer | MW-5 | 5/2/2007 | 23 – 33 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Central AOC | MW-05 | Surficial Aquifer | MW-05 | 12/18/2007 | 23 – 33 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Central AOC | MW-05 | Surficial Aquifer | CDL-MW5-00-009028 | 5/13/2016 | 23 – 33 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Central AOC | MW-05 | Surficial Aquifer | CDL-MW5-00-009028-02 | 11/15/2016 | 23 – 33 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Northern AOC | DPW9 | Surficial Aquifer | CDL-DPW09-00-4150 | 7/23/2015 | 20 – 25 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Northern AOC | DPW10 | Surficial Aquifer | CDL-DPW10-00-1726 | 7/21/2015 | 8 – 13 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Northern AOC | MW-06 | Surficial Aquifer | MW-6 | 5/2/2007 | 11 – 21 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Northern AOC | MW-06 | Surficial Aquifer | MW-06 | 12/18/2007 | 11 – 21 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Northern AOC | MW-06 | Surficial Aquifer | CDL-MW6-00-023042 | 5/13/2016 | 11 – 21 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Northern AOC | MW-06 | Surficial Aquifer | CDL-MW6-00-023042-02 | 11/15/2016 | 11 – 21 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Site-Wide | TOC-06 | Yorktown Aquifer | CDL-PWTOC06-00-309450 | 11/14/2016 | 154 – 225 | N | 48 | 0 | 0 | 0 | 18 | 0 | 0 | 66 |
| WG | Site-Wide | TOC-06 | Yorktown Aquifer | CDL-PWTOC06-01-309450 | 11/14/2016 | 154 – 225 | FD | 48 | 0 | 0 | 0 | 18 | 0 | 0 | 66 |
| WG | Site-Wide | TOC-06 | Yorktown Aquifer | CDL-PWTOC06-00-309450-02 | 11/8/2017 | 154 – 225 | N | 2 | 63 | 0 | 0 | 0 | 0 | 23 | 88 |
| WG | Site-Wide | TOC-06 | Yorktown Aquifer | CDL-PWTOC06-01-309450-02 | 11/8/2017 | 154 – 225 | FD | 2 | 63 | 0 | 0 | 0 | 0 | 23 | 88 |
| WG | Site-Wide | TOC-06 | Yorktown Aquifer | CDL-PWTOC06-04-309450-02 | 11/8/2017 | 154 – 225 | FD | 2 | 63 | 0 | 0 | 0 | 0 | 23 | 88 |
| WG | Southern AOC | DPW4 | Surficial Aquifer | CDL-DPW04-00-1928 | 7/23/2015 | 9 – 14 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Southern AOC | DPW4 | Surficial Aquifer | CDL-DPW04-01-1928 | 7/23/2015 | 9 – 14 | FD | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Southern AOC | DPW6 | Surficial Aquifer | CDL-DPW06-00-1130 | 7/23/2015 | 5 – 15 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Southern AOC | DPW7 | Surficial Aquifer | CDL-DPW07-1130 | 7/27/2015 | 5 – 15 | N | 50 | 62 | 0 | 0 | 0 | 0 | 23 | 135 |
| WG | Southern AOC | DPW8 | Surficial Aquifer | CDL-DPW08-00-1130 | 7/23/2015 | 5 – 15 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Southern AOC | DPW8 | Surficial Aquifer | CDL-DPW08-01-1130 | 7/23/2015 | 5 – 15 | FD | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 18 |
| WG | Southern AOC | DPW11 | Surficial Aquifer | CDL-DPW11-00-2130 | 7/27/2015 | 10 – 15 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Southern AOC | DPW16 | Surficial Aquifer | CDL-DPW16-00-2130 | 5/4/2016 | 10 – 15 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Southern AOC | DPW16 | Surficial Aquifer | CDL-DPW16-01-2130 | 5/4/2016 | 10 – 15 | FD | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Southern AOC | DPW17 | Surficial Aquifer | CDL-DPW17-00-1928 | 5/10/2016 | 9 – 14 | N | 50 | 62 | 0 | 0 | 18 | 0 | 23 | 153 |
| WG | Southern AOC | DTW3 | Surficial Aquifer | CDL-DTW3-00-097106 | 8/26/2016 | 47 – 52 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Southern AOC | DTW4 | Surficial Aquifer | CDL-DTW4-00-101110 | 8/17/2016 | 50 – 55 | N | 50 | 61 | 0 | 0 | 18 | 0 | 23 | 152 |
| WG | Southern AOC | MW-03 | Surficial Aquifer | MW-3 | 5/2/2007 | 3 – 13 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Southern AOC | MW-03 | Surficial Aquifer | MW-03 | 12/19/2007 | 3 – 13 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Southern AOC | MW-03 | Surficial Aquifer | MW-03-D | 12/19/2007 | 3 – 13 | FD | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Southern AOC | MW-03 | Surficial Aquifer | CDL-MW3-00-007026 | 5/13/2016 | 3 – 13 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Southern AOC | MW-03 | Surficial Aquifer | CDL-MW3-00-007026-02 | 11/15/2016 | 3 – 13 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |

Table 1-2
Samples Used Within HHRA - Summary
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility
Wallops Island, Virginia

| Medium | Exposure Area | Sample Location | Vertical Unit | Sample Name | Date | Depth (ft. bgs)[1] | Type | Result Count | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | VOC | SVOC | PEST | PCB | DIOX/FUR | CYANIDE | TOT MET | TOTAL |
| WG | Southern AOC | MW-03 | Surficial Aquifer | CDL-MW3-01-007026-02 | 11/15/2016 | 3 – 13 | FD | 2 | 63 | 0 | 0 | 0 | 0 | 23 | 88 |
| WG | Western AOC | DPW15 | Surficial Aquifer | CDL-DPW15-00-3140 | 5/5/2016 | 15 – 20 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |
| WG | Western AOC | MW-02 | Surficial Aquifer | MW-2 | 5/1/2007 | 14 – 24 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Western AOC | MW-02 | Surficial Aquifer | MW-02 | 12/18/2007 | 14 – 24 | N | 52 | 62 | 21 | 7 | 0 | 1 | 23 | 166 |
| WG | Western AOC | MW-02 | Surficial Aquifer | CDL-MW2-00-029048 | 5/13/2016 | 14 – 24 | N | 50 | 63 | 0 | 0 | 0 | 0 | 23 | 136 |
| WG | Western AOC | MW-02 | Surficial Aquifer | CDL-MW2-00-029048-02 | 11/15/2016 | 14 – 24 | N | 50 | 63 | 0 | 0 | 18 | 0 | 23 | 154 |

Notes:

(1) Depth interval for groundwater samples represents the screened interval from where the sample was collected.

AOC = Area of Concern

FD = Field Duplicate Sample

ft. bgs = feet below ground surface

N = Primary Sample

N/A = Not applicable

TOT MET = Total Metals

VOC = Volatile Organic Compounds

PEST = Pesticides

PCB = Polychlorinated Biphenyls

DIOX/FUR = Dioxins/Furans

SVOC = Semi-Volatile Organic Compounds

SD = Sediment

SS = Surface Soil

SB = Subsurface Soil

SW = Surface Water

WG = Groundwater

# Attachment 2

## Human Health Risk-Based Screening Results

Table 2-1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000053 – 0.000066 | 0.000033 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000051 – 0.000064 | 0.000032 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.00006 | 0.00003 | MDL | 0.15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000076 – 0.000096 | 0.000048 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000054 | 0.000027 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000077 | 0.0000385 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.000039 | 0.0000195 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000019 – 0.00024 | 0.00012 | MDL | 0.0053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000005 – 0.000063 | 0.0000315 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000051 | 0.0000255 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000061 | 0.0000305 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000062 | 0.000031 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000055 | 0.0000275 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000051 | 0.0000255 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000024 – 0.00031 | 0.000155 | MDL | 2700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000012 – 0.00015 | 0.000075 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000018 – 0.00022 | 0.00011 | MDL | 3300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000025 – 0.00032 | 0.00016 | MDL | 6100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000054 | 0.000027 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000051 | 0.0000255 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.000049 | 0.0000245 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000033 – 0.000041 | 0.0000205 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000062 | 0.000031 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000084 – 0.00011 | 0.000055 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.000048 | 0.000024 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000015 – 0.00019 | 0.000095 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000052 – 0.000065 | 0.0000325 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000052 | 0.000026 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000006 – 0.000075 | 0.0000375 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.000046 | 0.000023 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000011 – 0.00014 | 0.00007 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000061 | 0.0000305 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000071 – 0.000089 | 0.0000445 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.00005 | 0.000025 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000052 | 0.000026 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000078 – 0.000098 | 0.000049 | MDL | 55 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000013 – 0.00016 | 0.00008 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000005 – 0.000063 | 0.0000315 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000057 – 0.000072 | 0.000036 | MDL | 650 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000077 | 0.0000385 | MDL | 35 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.0000105 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000044 – 0.000055 | 0.0000275 | MDL | 65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000029 – 0.000037 | 0.0000185 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000073 – 0.000092 | 0.000046 | MDL | 8.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000061 | 0.0000305 | MDL | 490 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000076 | 0.000038 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.000044 | 0.000022 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000046 – 0.000058 | 0.000029 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000065 – 0.000081 | 0.0000405 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000057 – 0.000072 | 0.000036 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000044 – 0.000055 | 0.0000275 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 4.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000052 – 0.000055 | 0.0000275 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000029 – 0.000031 | 0.0000155 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000058 – 0.000062 | 0.000031 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00009 – 0.000095 | 0.0000475 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000053 – 0.000056 | 0.000028 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000041 – 0.000043 | 0.0000215 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00004 – 0.000042 | 0.000021 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000049 – 0.000052 | 0.000026 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000016 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000034 – 0.000036 | 0.000018 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.0000115 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000043 – 0.000046 | 0.000023 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00005 – 0.000053 | 0.0000265 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000033 – 0.000035 | 0.0000175 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.0000145 | MDL | 63 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000016 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000044 – 0.000047 | 0.0000235 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.0000115 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.0000085 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000026 | 0.000013 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000048 – 0.00005 | 0.000025 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 360 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.0000075 | MDL | 360 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.0000115 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000014 | 0.000007 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000016 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.0000065 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.0000085 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00001 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000014 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000014 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0558 | J | 0.0558 | J | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 1/4 | 25% | 0.000045 – 0.000047 | 0.0558 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000014 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000034 – 0.000036 | 0.000018 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.0000075 | MDL | 240 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000014 | 0.000007 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.0000085 | MDL | 7.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000008 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000008 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000024 | 0.000012 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000016 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.0000065 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.0000075 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.0000105 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000025 – 0.000027 | 0.0000135 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.0000115 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000026 | 0.000013 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000024 | 0.000012 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.0000075 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000039 – 0.000041 | 0.0000205 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000008 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000043 – 0.000046 | 0.000023 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.0000065 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000034 – 0.00000036 | 0.00000018 | MDL | 0.19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000037 | 1.85E-07 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.00000046 | 0.00000023 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.00000033 | 1.65E-07 | MDL | 0.039 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000026 – 0.00000028 | 0.00000014 | MDL | 0.086 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000002 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000003 – 0.00000032 | 0.00000016 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000052 – 0.00000055 | 2.75E-07 | MDL | 0.3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000038 | 0.00000019 | MDL | 0.034 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000002 | MDL | 38 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.0000004 | 0.0000002 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.00000039 | 1.95E-07 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000037 | 1.85E-07 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000033 – 0.00000035 | 1.75E-07 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.00000041 | 2.05E-07 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000028 – 0.0000003 | 0.00000015 | MDL | 0.57 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000002 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000036 – 0.00000039 | 1.95E-07 | MDL | 0.13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000041 | 2.05E-07 | MDL | 0.07 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000047 – 0.00000049 | 2.45E-07 | MDL | 32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000067 – 0.0000071 | 0.00000355 | MDL | 0.49 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000067 – 0.0000071 | 0.00000355 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000021 – 0.000022 | 0.000011 | MDL | 0.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00001 | MDL | 0.17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000011 – 0.000012 | 0.000006 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.0000065 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000071 – 0.0000075 | 0.00000375 | MDL | 0.24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.22 – 0.27 | 0.135 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 5110 | | 14300 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 14300 | MDC | 7700 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.75 – 0.83 | 0.415 | MDL | 3.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Arsenic | 7440-38-2 | 1.1 | | 2.5 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 2.5 | MDC | 0.68 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 11.5 | B | 25.7 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 25.7 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.1 | B | 0.26 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.26 | MDC | 16 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Cadmium | 7440-43-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.15 – 0.16 | 0.08 | MDL | 7.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Calcium | 7440-70-2 | 297 | B | 580 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 580 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 4.8 | | 11.5 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 11.5 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 1.2 | B | 3.3 | B | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 3.3 | MDC | 2.3 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 2.4 | B | 4.9 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 4.9 | MDC | 310 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 3460 | | 8880 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 8880 | MDC | 5500 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |

Table 2-1
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 7439-92-1 | 2.6 | | 5.2 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 5.2 | MDC | 200 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 384 | B | 887 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 887 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 26.2 | | 106 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 106 | MDC | 180 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.014 | B | 0.019 | B | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 3/4 | 75% | 0.0089 – 0.0089 | 0.019 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Nickel | 7440-02-0 | 2.6 | B | 7.2 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 7.2 | MDC | 150 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 247 | B | 431 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 431 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.78 – 0.87 | 0.435 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Silver | 7440-22-4 | 0.21 | B | 0.21 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 1/4 | 25% | 0.16 – 0.17 | 0.21 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Sodium | 7440-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 79 – 87 | 43.5 | MDL | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.059 | B | 0.18 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.18 | MDC | 0.078 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Vanadium | 7440-62-2 | 6.8 | | 16.9 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 16.9 | MDC | 39 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 6.5 | | 12.8 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 12.8 | MDC | 2300 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:
% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Subsurface Soil, 2 - 17.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.0053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000088 – 0.0000088 | 0.0000044 | MDL | 2700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000088 – 0.0000088 | 0.0000044 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000088 – 0.0000088 | 0.0000044 | MDL | 3300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000084 – 0.0000088 | 0.0000044 | MDL | 6100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 650 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Subsurface Soil, 2 - 17.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 35 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 8.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | 0.0017 | J | 0.0018 | J | mg/kg | DPT9 (7/24/2015) | 17 – 17.5 | 2/3 | 67% | 0.0000042 – 0.0000042 | 0.0018 | MDC | 490 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000042 – 0.0000045 | 0.00000225 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0000085 – 0.000009 | 0.0000045 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 4.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0007 – 0.00077 | 0.000385 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00017 – 0.00019 | 0.000095 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 63 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0007 – 0.00077 | 0.000385 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0007 – 0.00077 | 0.000385 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 360 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 360 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Subsurface Soil, 2 - 17.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00015 | 0.000075 | MDL | 170 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.11 | J | 0.11 | J | mg/kg | Multiple Locations | N/A | 2/3 | 67% | 0.00016 – 0.00016 | 0.11 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00015 | 0.000075 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 240 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 7.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.0007 – 0.00077 | 0.000385 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00028 – 0.00031 | 0.000155 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.00014 – 0.00016 | 0.00008 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.000017 – 0.000019 | 0.0000095 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 4300 | B | 7500 | B | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 7500 | MDC | 7700 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.71 – 0.83 | 0.415 | MDL | 3.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Arsenic | 7440-38-2 | 0.91 | | 1.1 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 1.1 | MDC | 0.68 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 9.2 | | 14 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 14 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Table 2-2
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Northern AOC; Subsurface Soil, 2 - 17.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Beryllium | 7440-41-7 | 0.06 | J | 0.084 | J | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 0.084 | MDC | 16 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Cadmium | 7440-43-9 | 0.052 | J | 0.058 | J | mg/kg | DPT9 (7/24/2015) | 17 – 17.5 | 2/3 | 67% | 0.11 – 0.11 | 0.058 | MDC | 7.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Calcium | 7440-70-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 120 – 140 | 70 | MDL | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 5.5 | | 12 | | mg/kg | Multiple Locations | N/A | 3/3 | 100% | N/A | 12 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 0.69 | J | 1.3 | J | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 1.3 | MDC | 2.3 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 2.5 | J | 5 | B | mg/kg | Multiple Locations | N/A | 3/3 | 100% | N/A | 5 | MDC | 310 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 2900 | | 3200 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 3200 | MDC | 5500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | 2.4 | | 2.9 | | mg/kg | Multiple Locations | N/A | 3/3 | 100% | N/A | 2.9 | MDC | 200 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 230 | J | 310 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 310 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 30 | | 39 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 39 | MDC | 180 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.039 – 0.041 | 0.0205 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nickel | 7440-02-0 | 2.8 | | 4.4 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 4.4 | MDC | 150 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 120 – 140 | 70 | MDL | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.76 – 0.88 | 0.44 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Silver | 7440-22-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 0.24 – 0.27 | 0.135 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Sodium | 7440-23-5 | 22 | J | 32 | J | mg/kg | Multiple Locations | N/A | 3/3 | 100% | N/A | 32 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/3 | 0% | 1.2 – 1.4 | 0.7 | MDL | 0.078 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Vanadium | 7440-62-2 | 5.1 | | 7.1 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 7.1 | MDC | 39 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 5 | | 32 | | mg/kg | Multiple Locations | N/A | 3/3 | 100% | N/A | 32 | MDC | 2300 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Western AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000052 – 0.000063 | 0.0000315 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000005 – 0.000061 | 0.0000305 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000047 – 0.000057 | 0.0000285 | MDL | 0.15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000075 – 0.000091 | 0.0000455 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000042 – 0.000051 | 0.0000255 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000006 – 0.000073 | 0.0000365 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.000037 | 0.0000185 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000019 – 0.00023 | 0.000115 | MDL | 0.0053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.00006 | 0.00003 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000048 | 0.000024 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000057 | 0.0000285 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000059 | 0.0000295 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000052 | 0.000026 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000049 | 0.0000245 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000024 – 0.00029 | 0.000145 | MDL | 2700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000012 – 0.00014 | 0.00007 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000017 – 0.00021 | 0.000105 | MDL | 3300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000025 – 0.0003 | 0.00015 | MDL | 6100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000042 – 0.000051 | 0.0000255 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000048 | 0.000024 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.000046 | 0.000023 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000032 – 0.000039 | 0.0000195 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000058 | 0.000029 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000083 – 0.0001 | 0.00005 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.000046 | 0.000023 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000015 – 0.00018 | 0.00009 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000051 – 0.000062 | 0.000031 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000049 | 0.0000245 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000059 – 0.000071 | 0.0000355 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000036 – 0.000044 | 0.000022 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000011 – 0.00014 | 0.00007 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000058 | 0.000029 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000007 – 0.000084 | 0.000042 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.000048 | 0.000024 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000025 | 0.0000125 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000049 | 0.0000245 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000077 – 0.000093 | 0.0000465 | MDL | 55 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000012 – 0.00015 | 0.000075 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000059 | 0.0000295 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Western AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000056 – 0.000068 | 0.000034 | MDL | 650 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000073 | 0.0000365 | MDL | 35 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000022 | 0.000011 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000052 | 0.000026 | MDL | 65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000029 – 0.000035 | 0.0000175 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000072 – 0.000087 | 0.0000435 | MDL | 8.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000047 – 0.000057 | 0.0000285 | MDL | 490 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000006 – 0.000072 | 0.000036 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000034 – 0.000041 | 0.0000205 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000046 – 0.000055 | 0.0000275 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000064 – 0.000077 | 0.0000385 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000057 – 0.000068 | 0.000034 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000052 | 0.000026 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 4.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000055 – 0.000058 | 0.000029 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000032 | 0.000016 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000061 – 0.000064 | 0.000032 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000093 – 0.000099 | 0.0000495 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000055 – 0.000059 | 0.0000295 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000042 – 0.000045 | 0.0000225 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000041 – 0.000044 | 0.000022 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000051 – 0.000054 | 0.000027 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000033 | 0.0000165 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000025 | 0.0000125 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000036 – 0.000038 | 0.000019 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000045 – 0.000048 | 0.000024 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000052 – 0.000055 | 0.0000275 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000035 – 0.000037 | 0.0000185 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000028 – 0.00003 | 0.000015 | MDL | 63 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000032 – 0.000034 | 0.000017 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.00002 | 0.00001 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000046 – 0.000049 | 0.0000245 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000025 – 0.000027 | 0.0000135 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000049 – 0.000052 | 0.000026 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00001 | MDL | 360 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000008 | MDL | 360 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Western AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.0000075 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000033 | 0.0000165 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000013 | 0.0000065 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.0000105 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.0000145 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000025 | 0.0000125 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.0000145 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.085 | | 0.085 | | mg/kg | SB-2B (4/17/2007) | 0.5 – 2 | 1/4 | 25% | 0.000047 – 0.000049 | 0.085 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.0000145 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000035 – 0.000037 | 0.0000185 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000008 | MDL | 240 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000014 | 0.000007 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00001 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 7.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.0000085 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.0000085 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000025 | 0.0000125 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000033 | 0.0000165 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000014 | 0.000007 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000015 | 0.0000075 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000021 – 0.000022 | 0.000011 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000014 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000012 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.0000095 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000025 – 0.000027 | 0.0000135 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000025 | 0.0000125 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000008 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000041 – 0.000043 | 0.0000215 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.0000085 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000045 – 0.000048 | 0.000024 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000013 | 0.0000065 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000037 | 1.85E-07 | MDL | 0.19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,4'-DDE | 72-55-9 | 0.0016 | | 0.0016 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 1/4 | 25% | 0.00000036 – 0.00000039 | 0.0016 | MDC | 2 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000044 – 0.00000047 | 2.35E-07 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Western AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000032 – 0.00000034 | 0.00000017 | MDL | 0.039 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000027 – 0.00000029 | 1.45E-07 | MDL | 0.086 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000042 | 0.00000021 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.00000034 | 0.00000017 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000053 – 0.00000057 | 2.85E-07 | MDL | 0.3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.00000039 | 1.95E-07 | MDL | 0.034 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000042 | 0.00000021 | MDL | 38 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000041 | 2.05E-07 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.00000041 | 2.05E-07 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000036 – 0.00000039 | 1.95E-07 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000034 – 0.00000037 | 1.85E-07 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.00000042 | 0.00000021 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000029 – 0.00000031 | 1.55E-07 | MDL | 0.57 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000042 | 0.00000021 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000002 | MDL | 0.13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.00000043 | 2.15E-07 | MDL | 0.07 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.00000051 | 2.55E-07 | MDL | 32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000069 – 0.0000074 | 0.0000037 | MDL | 0.49 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000069 – 0.0000073 | 0.00000365 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.0000115 | MDL | 0.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.0000105 | MDL | 0.17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000011 – 0.000012 | 0.000006 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.0000065 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000073 – 0.0000077 | 0.00000385 | MDL | 0.24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.22 – 0.26 | 0.13 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7010 | | 13300 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 13300 | MDC | 7700 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.78 – 0.85 | 0.425 | MDL | 3.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Arsenic | 7440-38-2 | 1.7 | | 4.4 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 4.4 | MDC | 0.68 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 16.7 | B | 32.4 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 32.4 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.17 | B | 0.25 | B | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.25 | MDC | 16 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Cadmium | 7440-43-9 | 0.17 | B | 0.24 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 2/4 | 50% | 0.15 – 0.16 | 0.24 | MDC | 7.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Calcium | 7440-70-2 | 285 | B | 657 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 657 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 6.5 | | 11.4 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 11.4 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 1.6 | B | 4.3 | B | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 4.3 | MDC | 2.3 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 3.5 | | 7.7 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 7.7 | MDC | 310 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 4080 | | 10600 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 10600 | MDC | 5500 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |

Table 2-3
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Western AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 7439-92-1 | 3.2 | | 17.3 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 17.3 | MDC | 200 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 335 | B | 926 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 926 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 48.8 | | 122 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 122 | MDC | 180 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.013 | B | 0.077 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 0.077 | MDC | 1.1 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Nickel | 7440-02-0 | 4 | B | 6.9 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 6.9 | MDC | 150 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 254 | B | 518 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 518 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.82 – 0.89 | 0.445 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Silver | 7440-22-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.16 – 0.18 | 0.09 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Sodium | 7440-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 82 – 89 | 44.5 | MDL | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.029 | B | 0.079 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 0.079 | MDC | 0.078 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Vanadium | 7440-62-2 | 7.9 | | 18.4 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 18.4 | MDC | 39 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 8.5 | B | 20 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 20 | MDC | 2300 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:
% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-4
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000055 – 0.000091 | 0.0000455 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000054 – 0.000088 | 0.000044 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000005 – 0.000082 | 0.000041 | MDL | 0.15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000008 – 0.00013 | 0.000065 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000045 – 0.000074 | 0.000037 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000064 – 0.00011 | 0.000055 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000033 – 0.000054 | 0.000027 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000002 – 0.00033 | 0.000165 | MDL | 0.0053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000053 – 0.000087 | 0.0000435 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.00007 | 0.000035 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000051 – 0.000083 | 0.0000415 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.000085 | 0.0000425 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000046 – 0.000075 | 0.0000375 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.000071 | 0.0000355 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000026 – 0.00042 | 0.00021 | MDL | 2700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000013 – 0.00021 | 0.000105 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000019 – 0.00031 | 0.000155 | MDL | 3300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | 0.0378 | | 0.0378 | | mg/kg | TP-6A (4/10/2007) | 0 – 0.5 | 1/9 | 11% | 0.0000027 – 0.00044 | 0.0378 | MDC | 6100 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000045 – 0.000074 | 0.000037 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.00007 | 0.000035 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000041 – 0.000067 | 0.0000335 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000035 – 0.000057 | 0.0000285 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.000085 | 0.0000425 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000089 – 0.00015 | 0.000075 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000041 – 0.000067 | 0.0000335 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000016 – 0.00027 | 0.000135 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000054 – 0.000089 | 0.0000445 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.000071 | 0.0000355 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000063 – 0.0001 | 0.00005 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000039 – 0.000064 | 0.000032 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000012 – 0.0002 | 0.0001 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000051 – 0.000084 | 0.000042 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000074 – 0.00012 | 0.00006 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | 0.00063 | J | 0.00063 | J | mg/kg | P-1A (BURN AREA) (4/9/200 | 0 – 0.5 | 1/9 | 11% | 0.00000042 – 0.000069 | 0.00063 | MDC | 5.8 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000023 – 0.00015 | 0.000075 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000044 – 0.000071 | 0.0000355 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | 0.0035 | | 0.0035 | | mg/kg | P-1A (BURN AREA) (4/9/200 | 0 – 0.5 | 1/9 | 11% | 0.00000082 – 0.00013 | 0.0035 | MDC | 55 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Methyl Acetate | 79-20-9 | 1.19 | | 1.19 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.0000013 – 0.00019 | 1.19 | MDC | 7800 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.000086 | 0.000043 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-4
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | 0.0025 | J | 0.0025 | J | mg/kg | -1A (BURN AREA) (4/9/200 | 0 – 0.5 | 1/9 | 11% | 0.0000006 – 0.000099 | 0.0025 | MDC | 650 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000065 – 0.00011 | 0.000055 | MDL | 35 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00002 – 0.00013 | 0.000065 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | 0.0014 | | 0.0014 | | mg/kg | -1A (BURN AREA) (4/9/200 | 0 – 0.5 | 1/9 | 11% | 0.00000046 – 0.000076 | 0.0014 | MDC | 65 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000031 – 0.00005 | 0.000025 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000077 – 0.00013 | 0.000065 | MDL | 8.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | 0.00096 | J | 0.00096 | J | mg/kg | -1A (BURN AREA) (4/9/200 | 0 – 0.5 | 1/9 | 11% | 0.00000051 – 0.000083 | 0.00096 | MDC | 490 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000064 – 0.0001 | 0.00005 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000037 – 0.00006 | 0.00003 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000049 – 0.00008 | 0.00004 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000068 – 0.00011 | 0.000055 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000006 – 0.000099 | 0.0000495 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | 0.0049 | | 0.0049 | | mg/kg | -1A (BURN AREA) (4/9/200 | 0 – 0.5 | 1/9 | 11% | 0.00000046 – 0.000076 | 0.0049 | MDC | 58 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00011 | 0.000055 | MDL | 4.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000052 – 0.00035 | 0.000175 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000029 – 0.0002 | 0.0001 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000058 – 0.00039 | 0.000195 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000089 – 0.0006 | 0.0003 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000053 – 0.00036 | 0.00018 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00004 – 0.00027 | 0.000135 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00004 – 0.00027 | 0.000135 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000049 – 0.00033 | 0.000165 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0001 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000023 – 0.00015 | 0.000075 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000034 – 0.00023 | 0.000115 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.000075 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000043 – 0.00029 | 0.000145 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00005 – 0.00034 | 0.00017 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000033 – 0.00022 | 0.00011 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000027 – 0.00018 | 0.00009 | MDL | 63 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0001 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000018 – 0.00012 | 0.00006 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000044 – 0.0003 | 0.00015 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.000075 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000016 – 0.00011 | 0.000055 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000024 – 0.00016 | 0.00008 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000047 – 0.00032 | 0.00016 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000018 – 0.00012 | 0.00006 | MDL | 360 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | 0.158 | J | 0.158 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.000014 – 0.000095 | 0.158 | MDC | 360 | * | RSL | No | 1/2 MDL and MDC ≤ SL |

Table 2-4
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.000075 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | 0.222 | J | 0.267 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000013 – 0.000016 | 0.267 | MDC | 1800 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0001 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | 0.0542 | J | 0.0542 | J | mg/kg | TP-6A (4/10/2007) | 0 – 0.5 | 1/1 | 100% | N/A | 0.0542 | MDC | 170 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Benzo(a)anthracene | 56-55-3 | 1.77 | | 2.49 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000017 – 0.00002 | 2.49 | MDC | 1.1 | | RSL | Yes | MDC > SL |
| Benzo(a)pyrene | 50-32-8 | 1.59 | | 1.91 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000014 | 1.91 | MDC | 0.11 | | RSL | Yes | MDC > SL |
| Benzo(b)fluoranthene | 205-99-2 | 1.11 | | 1.39 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000016 – 0.000019 | 1.39 | MDC | 1.1 | | RSL | Yes | MDC > SL |
| Benzo(g,h,i)perylene | 191-24-2 | 1.01 | | 1.18 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000019 – 0.000022 | 1.18 | MDC | 180 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | 0.635 | | 1.03 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000026 – 0.000031 | 1.03 | MDC | 11 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.000075 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00012 | 0.00006 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000026 – 0.00018 | 0.00009 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0519 | J | 0.0519 | J | mg/kg | SB-4B (4/18/2007) | 0.5 – 2 | 1/9 | 11% | 0.000045 – 0.0003 | 0.0519 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000026 – 0.00018 | 0.00009 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000034 – 0.00023 | 0.000115 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000014 – 0.000095 | 0.0000475 | MDL | 240 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | 2.81 | J | 4.04 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000013 – 0.000015 | 4.04 | MDC | 110 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | 0.388 | J | 0.388 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.000018 – 0.00012 | 0.388 | MDC | 0.11 | | RSL | Yes | MDC > SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000016 – 0.00011 | 0.000055 | MDL | 7.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000015 – 0.0001 | 0.00005 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000015 – 0.0001 | 0.00005 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.000075 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0001 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | 1.5 | | 1.79 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000015 | 1.79 | MDC | 240 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000014 – 0.000094 | 0.000047 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00002 – 0.00014 | 0.00007 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000025 – 0.00017 | 0.000085 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00012 | 0.00006 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.577 | | 0.617 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000022 – 0.000026 | 0.617 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00012 | 0.00006 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000024 – 0.00016 | 0.00008 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.000075 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000014 – 0.000097 | 0.0000485 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000039 – 0.00026 | 0.00013 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | 1.47 | | 2.23 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000015 – 0.000018 | 2.23 | MDC | 1800 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000043 – 0.00029 | 0.000145 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | 3.33 | | 4.74 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000014 | 4.74 | MDC | 180 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0019 | | 0.0113 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 4/9 | 44% | 0.00000034 – 0.00000037 | 0.0113 | MDC | 0.19 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 4,4'-DDE | 72-55-9 | 0.002 | | 0.137 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 6/9 | 67% | 0.00000035 – 0.00000038 | 0.137 | MDC | 2 | | RSL | No | 1/2 MDL and MDC ≤ SL |

Table 2-4
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | 0.0024 | J | 0.274 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 5/9 | 56% | 0.00000043 – 0.00000048 | 0.274 | MDC | 1.9 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000031 – 0.00000041 | 2.05E-07 | MDL | 0.039 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000026 – 0.00000035 | 1.75E-07 | MDL | 0.086 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.00000051 | 2.55E-07 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000031 – 0.00000041 | 2.05E-07 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.00000069 | 3.45E-07 | MDL | 0.3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000036 – 0.00000048 | 0.00000024 | MDL | 0.034 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.00000051 | 2.55E-07 | MDL | 38 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.0000005 | 0.00000025 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000037 – 0.0000005 | 0.00000025 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000035 – 0.00000047 | 2.35E-07 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000033 – 0.00000044 | 0.00000022 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000039 – 0.00000052 | 0.00000026 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000028 – 0.00000038 | 0.00000019 | MDL | 0.57 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.00000051 | 2.55E-07 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000037 – 0.00000049 | 2.45E-07 | MDL | 0.13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000039 – 0.00000052 | 0.00000026 | MDL | 0.07 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000047 – 0.00000063 | 3.15E-07 | MDL | 32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000067 – 0.000009 | 0.0000045 | MDL | 0.49 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000067 – 0.0000089 | 0.00000445 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000021 – 0.000028 | 0.000014 | MDL | 0.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000019 – 0.000026 | 0.000013 | MDL | 0.17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000011 – 0.000015 | 0.0000075 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000012 – 0.000016 | 0.000008 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.000022 | 0.000011 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000071 – 0.0000095 | 0.00000475 | MDL | 0.24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.23 – 0.31 | 0.155 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 4600 | | 21100 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 21100 | MDC | 7700 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.76 – 1.1 | 0.55 | MDL | 3.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Arsenic | 7440-38-2 | 1.7 | | 4.8 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 4.8 | MDC | 0.68 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 15.9 | B | 195 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 195 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.1 | B | 1.3 | | mg/kg | -1A (BURN AREA) (4/9/200 | 0 – 0.5 | 9/9 | 100% | N/A | 1.3 | MDC | 16 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Cadmium | 7440-43-9 | 0.23 | B | 0.76 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 3/9 | 33% | 0.15 – 0.17 | 0.76 | MDC | 7.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Calcium | 7440-70-2 | 282 | B | 71900 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 71900 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 5.3 | | 126 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 126 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 1.5 | B | 28 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 28 | MDC | 2.3 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 3 | | 10.7 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 10.7 | MDC | 310 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Table 2-4
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 7439-89-6 | 3520 | | 24800 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 24800 | MDC | 5500 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | 3.4 | | 121 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 121 | MDC | 200 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 346 | B | 76700 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 76700 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 40.4 | | 372 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 372 | MDC | 180 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.014 | B | 0.23 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 0.23 | MDC | 1.1 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Nickel | 7440-02-0 | 2.9 | B | 502 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 502 | MDC | 150 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 251 | B | 701 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 701 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 1.5 | B | 1.5 | B | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.79 – 0.97 | 1.5 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Silver | 7440-22-4 | 0.35 | B | 0.57 | B | mg/kg | SB-5A (4/18/2007) | 0 – 0.5 | 3/9 | 33% | 0.16 – 0.22 | 0.57 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Sodium | 7440-23-5 | 84.3 | B | 115 | B | mg/kg | SB-5A (4/18/2007) | 0 – 0.5 | 3/9 | 33% | 83 – 110 | 115 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.03 | B | 0.2 | B | mg/kg | P-1A (BURN AREA) (4/9/200 | 0 – 0.5 | 9/9 | 100% | N/A | 0.2 | MDC | 0.078 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Vanadium | 7440-62-2 | 7 | | 32.5 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 32.5 | MDC | 39 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 7.4 | | 146 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 146 | MDC | 2300 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-5
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Subsurface Soil, 2 - 17 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000037 – 0.022 | 0.011 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | 25 | J | 28 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 2/15 | 13% | 0.0000037 – 0.022 | 28 | MDC | 0.15 | | RSL | Yes | MDC > SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.0053 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | 0.238 | | 0.238 | | mg/kg | -1C (BURN AREA) (4/9/200 | 2 – 8.5 | 1/15 | 7% | 0.0000035 – 0.022 | 0.238 | MDC | 0.46 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | 0.011 | J | 0.011 | J | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 1/15 | 7% | 0.000007 – 0.043 | 0.011 | MDC | 2700 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Hexanone | 591-78-6 | 86 | J | 86 | J | mg/kg | TP13B (6/4/2015) | 4.5 – 5 | 1/15 | 7% | 0.000007 – 0.043 | 86 | MDC | 20 | | RSL | Yes | MDC > SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | 74 | J | 74 | J | mg/kg | TP13B (6/4/2015) | 4.5 – 5 | 1/15 | 7% | 0.000007 – 0.043 | 74 | MDC | 3300 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Acetone | 67-64-1 | 0.044 | J | 2.23 | J | mg/kg | -1C (BURN AREA) (4/9/200 | 2 – 8.5 | 3/15 | 20% | 0.0000072 – 0.044 | 2.23 | MDC | 6100 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | 0.185 | | 3 | J | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 4/15 | 27% | 0.0000035 – 0.022 | 3 | MDC | 1.2 | | RSL | Yes | MDC > SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | 0.19 | | 38 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 5/15 | 33% | 0.0000037 – 0.022 | 38 | MDC | 650 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | 0.361 | | 16 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 7/15 | 47% | 0.0000037 – 0.022 | 16 | MDC | 5.8 | | RSL | Yes | MDC > SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000024 – 0.0016 | 0.0008 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | 0.043 | | 11 | J | mg/kg | TP11C (5/28/2015) | 11 – 12 | 8/16 | 50% | 0.0000037 – 0.000062 | 11 | MDC | 190 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| m,p-Xylene | 179601-23-1 | 0.0968 | J | 2 | | mg/kg | -1C (BURN AREA) (4/9/200 | 2 – 8.5 | 2/2 | 100% | N/A | 2 | MDC | 55 | * | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-5
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Subsurface Soil, 2 - 17 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | 0.179 | J | 170 | | mg/kg | TP11C (5/28/2015) | 11 – 12 | 9/16 | 56% | 0.0000037 – 0.0000053 | 170 | MDC | 650 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 35 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | 0.096 | J | 12 | | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 9/16 | 56% | 0.000018 – 0.000022 | 12 | MDC | 2 | | RSL | Yes | MDC > SL |
| o-Xylene | 95-47-6 | 0.132 | | 0.828 | | mg/kg | -1C (BURN AREA) (4/9/20 | 2 – 8.5 | 2/2 | 100% | N/A | 0.828 | MDC | 65 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 8.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | 0.0017 | J | 1.9 | | mg/kg | TP24A (6/10/2015) | 5.5 – 6 | 5/15 | 33% | 0.0000035 – 0.022 | 1.9 | MDC | 490 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.0000035 – 0.022 | 0.011 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | 0.229 | | 59 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 9/16 | 56% | 0.0000074 – 0.000011 | 59 | MDC | 58 | | RSL | Yes | MDC > SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 0.3 | J | 2.2 | | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 5/16 | 31% | 0.000017 – 0.0016 | 2.2 | MDC | 4.7 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000054 – 0.0016 | 0.0008 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.00003 – 0.0016 | 0.0008 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.00006 – 0.0016 | 0.0008 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | 0.068 | J | 0.068 | J | mg/kg | TP24A (6/10/2015) | 5.5 – 6 | 1/15 | 7% | 0.000091 – 0.0016 | 0.068 | MDC | 130 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000054 – 0.0081 | 0.00405 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000041 – 0.0016 | 0.0008 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000041 – 0.0016 | 0.0008 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.00005 – 0.0016 | 0.0008 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000031 – 0.0016 | 0.0008 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | 0.064 | J | 19 | | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 9/16 | 56% | 0.000018 – 0.000026 | 19 | MDC | 24 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000035 – 0.0016 | 0.0008 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000023 – 0.0016 | 0.0008 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000044 – 0.0016 | 0.0008 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000051 – 0.0017 | 0.00085 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000034 – 0.002 | 0.001 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | 0.22 | J | 0.22 | J | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 1/15 | 7% | 0.000028 – 0.0016 | 0.22 | MDC | 63 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000031 – 0.0081 | 0.00405 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000018 – 0.0016 | 0.0008 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000045 – 0.0016 | 0.0008 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000022 – 0.0016 | 0.0008 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000017 – 0.0016 | 0.0008 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000025 – 0.0016 | 0.0008 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000049 – 0.0081 | 0.00405 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | 0.16 | J | 4 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 6/15 | 40% | 0.000018 – 0.000095 | 4 | MDC | 360 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Acenaphthylene | 208-96-8 | 0.038 | J | 0.43 | J | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 3/15 | 20% | 0.000014 – 0.000095 | 0.43 | MDC | 360 | * | RSL | No | 1/2 MDL and MDC ≤ SL |

Table 2-5
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Subsurface Soil, 2 - 17 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000023 – 0.0016 | 0.0008 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | 0.17 | J | 13 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000014 – 0.000095 | 13 | MDC | 1800 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000031 – 0.0016 | 0.0008 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/13 | 0% | 0.00014 – 0.0016 | 0.0008 | MDL | 170 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | 0.13 | J | 27 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000017 – 0.000095 | 27 | MDC | 1.1 | | RSL | Yes | MDC > SL |
| Benzo(a)pyrene | 50-32-8 | 0.085 | J | 23 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000012 – 0.000095 | 23 | MDC | 0.11 | | RSL | Yes | MDC > SL |
| Benzo(b)fluoranthene | 205-99-2 | 0.12 | J | 29 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000016 – 0.000095 | 29 | MDC | 1.1 | | RSL | Yes | MDC > SL |
| Benzo(g,h,i)perylene | 191-24-2 | 0.039 | J | 9.6 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 6/16 | 38% | 0.000018 – 0.000095 | 9.6 | MDC | 180 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | 0.045 | J | 11 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000018 – 0.000095 | 11 | MDC | 11 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000023 – 0.0016 | 0.0008 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000018 – 0.0016 | 0.0008 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000027 – 0.0016 | 0.0008 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.102 | | 4.6 | J | mg/kg | TP12C (6/2/2015) | 4.5 – 5 | 2/15 | 13% | 0.000046 – 0.0016 | 4.6 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000027 – 0.0016 | 0.0008 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000034 – 0.0016 | 0.0008 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | 0.06 | J | 4.2 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 5/15 | 33% | 0.000014 – 0.00078 | 4.2 | MDC | 240 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Chrysene | 218-01-9 | 0.076 | J | 25 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000013 – 0.000095 | 25 | MDC | 110 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000018 – 0.0002 | 0.0001 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | 0.11 | J | 2.6 | | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 6/16 | 38% | 0.000017 – 0.00078 | 2.6 | MDC | 7.8 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000015 – 0.0016 | 0.0008 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000015 – 0.0016 | 0.0008 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | 0.065 | J | 0.69 | | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 2/15 | 13% | 0.000023 – 0.0016 | 0.69 | MDC | 630 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000031 – 0.0016 | 0.0008 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | 0.32 | J | 50 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000013 – 0.000095 | 50 | MDC | 240 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluorene | 86-73-7 | 0.2 | J | 5.3 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000014 – 0.000095 | 5.3 | MDC | 240 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000021 – 0.0016 | 0.0008 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000026 – 0.0081 | 0.00405 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000018 – 0.0016 | 0.0008 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.037 | J | 9.6 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 6/16 | 38% | 0.000018 – 0.000095 | 9.6 | MDC | 1.1 | | RSL | Yes | MDC > SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000018 – 0.0016 | 0.0008 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000025 – 0.0016 | 0.0008 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000023 – 0.0016 | 0.0008 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000015 – 0.0016 | 0.0008 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.00004 – 0.0033 | 0.00165 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | 0.24 | J | 39 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 9/16 | 56% | 0.000016 – 0.000021 | 39 | MDC | 1800 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/15 | 0% | 0.000044 – 0.0016 | 0.0008 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | 0.24 | J | 45 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000012 – 0.000095 | 45 | MDC | 180 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0257 | | 0.0257 | | mg/kg | SB-4C (4/18/2007) | 9 – 10 | 1/2 | 50% | 0.00000034 – 0.00000034 | 0.0257 | MDC | 0.19 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000036 – 0.00000039 | 1.95E-07 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-5
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Subsurface Soil, 2 - 17 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000044 – 0.00000048 | 0.00000024 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000032 – 0.00000034 | 0.00000017 | MDL | 0.039 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000027 – 0.00000029 | 1.45E-07 | MDL | 0.086 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000039 – 0.00000042 | 0.00000021 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000031 – 0.00000034 | 0.00000017 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000053 – 0.00000058 | 0.00000029 | MDL | 0.3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000036 – 0.00000039 | 1.95E-07 | MDL | 0.034 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000039 – 0.00000042 | 0.00000021 | MDL | 38 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000038 – 0.00000042 | 0.00000021 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000038 – 0.00000041 | 2.05E-07 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000036 – 0.00000039 | 1.95E-07 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000034 – 0.00000037 | 1.85E-07 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000039 – 0.00000043 | 2.15E-07 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000029 – 0.00000031 | 1.55E-07 | MDL | 0.57 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000039 – 0.00000042 | 0.00000021 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000037 – 0.00000041 | 2.05E-07 | MDL | 0.13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000004 – 0.00000043 | 2.15E-07 | MDL | 0.07 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000048 – 0.00000052 | 0.00000026 | MDL | 32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000068 – 0.0000074 | 0.0000037 | MDL | 0.49 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000067 – 0.0000074 | 0.0000037 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000021 – 0.000023 | 0.0000115 | MDL | 0.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000021 | 0.0000105 | MDL | 0.17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000011 – 0.000012 | 0.000006 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000012 – 0.000014 | 0.000007 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000018 | 0.000009 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000071 – 0.0000079 | 0.00000395 | MDL | 0.24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.24 – 0.25 | 0.125 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 3380 | | 18000 | B | mg/kg | TP11B (5/28/2015) | 11 – 12 | 16/16 | 100% | N/A | 18000 | MDC | 7700 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | 0.59 | J | 17 | | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 4/16 | 25% | 0.8 – 1.7 | 17 | MDC | 3.1 | | RSL | Yes | MDC > SL |
| Arsenic | 7440-38-2 | 0.63 | J | 59 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 15/16 | 94% | 0.39 – 0.39 | 59 | MDC | 0.68 | | RSL | Yes | MDC > SL |
| Barium | 7440-39-3 | 7.3 | B | 510 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 510 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.031 | J | 0.39 | | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 14/16 | 88% | 0.14 – 0.15 | 0.39 | MDC | 16 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Cadmium | 7440-43-9 | 0.027 | J | 3.2 | J | mg/kg | TP24A (6/10/2015) | 5.5 – 6 | 10/16 | 63% | 0.11 – 0.16 | 3.2 | MDC | 7.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Calcium | 7440-70-2 | 109 | B | 18000 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 13/16 | 81% | 140 – 140 | 18000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 2.8 | | 63 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 63 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 0.36 | J | 12 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 12 | MDC | 2.3 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 0.91 | | 130 | B | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 16/16 | 100% | N/A | 130 | MDC | 310 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Table 2-5
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Central AOC; Subsurface Soil, 2 - 17 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 7439-89-6 | 1390 | | 35000 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 35000 | MDC | 5500 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | 2.6 | | 4900 | | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 16/16 | 100% | N/A | 4900 | MDC | 200 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 126 | B | 14000 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 14000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 7.1 | | 170 | J | mg/kg | TP12C (6/2/2015) | 4.5 – 5 | 16/16 | 100% | N/A | 170 | MDC | 180 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.0092 | J | 0.23 | | mg/kg | TP24A (6/10/2015) | 5.5 – 6 | 9/16 | 56% | 0.0093 – 0.047 | 0.23 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Nickel | 7440-02-0 | 1 | B | 31 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 31 | MDC | 150 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 124 | B | 1700 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 12/16 | 75% | 140 – 140 | 1700 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/16 | 0% | 0.83 – 4.8 | 2.4 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Silver | 7440-22-4 | 0.12 | J | 0.59 | J | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 2/16 | 13% | 0.17 – 0.55 | 0.59 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Sodium | 7440-23-5 | 19 | J | 290 | J | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 9/16 | 56% | 83 – 280 | 290 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.034 | B | 0.034 | B | mg/kg | SB-4C (4/18/2007) | 9 – 10 | 1/16 | 6% | 0.042 – 2.8 | 0.034 | MDC | 0.078 | | RSL | See DSA | MDC ≤ SL < 1/2 MDL |
| Vanadium | 7440-62-2 | 3.6 | B | 27 | | mg/kg | TP11B (5/28/2015) | 11 – 12 | 16/16 | 100% | N/A | 27 | MDC | 39 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 2.8 | B | 750 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 750 | MDC | 2300 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-6
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000048 – 0.000082 | 0.000041 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000046 – 0.00008 | 0.00004 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000043 – 0.000074 | 0.000037 | MDL | 0.15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000069 – 0.00012 | 0.00006 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000039 – 0.000067 | 0.0000335 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000055 – 0.000095 | 0.0000475 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000028 – 0.000049 | 0.0000245 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000017 – 0.0003 | 0.00015 | MDL | 0.0053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000046 – 0.000079 | 0.0000395 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000063 | 0.0000315 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000044 – 0.000075 | 0.0000375 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000045 – 0.000077 | 0.0000385 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000039 – 0.000068 | 0.000034 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000064 | 0.000032 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000022 – 0.00038 | 0.00019 | MDL | 2700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000011 – 0.00019 | 0.000095 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000016 – 0.00028 | 0.00014 | MDL | 3300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | 0.012 | J | 0.012 | J | mg/kg | TP22B (6/5/2015) | 1.5 – 2 | 1/14 | 7% | 0.0000023 – 0.0004 | 0.012 | MDC | 6100 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | 0.0014 | J | 0.0014 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 1/14 | 7% | 0.00000039 – 0.000067 | 0.0014 | MDC | 1.2 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000063 | 0.0000315 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000035 – 0.00006 | 0.00003 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000003 – 0.000051 | 0.0000255 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000045 – 0.000077 | 0.0000385 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000077 – 0.00013 | 0.000065 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000035 – 0.00006 | 0.00003 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000014 – 0.00024 | 0.00012 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000047 – 0.000081 | 0.0000405 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000064 | 0.000032 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000054 – 0.000093 | 0.0000465 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000033 – 0.000058 | 0.000029 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000001 – 0.00018 | 0.00009 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000044 – 0.000076 | 0.000038 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000064 – 0.00011 | 0.000055 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000036 – 0.000063 | 0.0000315 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000024 – 0.00018 | 0.00009 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000065 | 0.0000325 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000071 – 0.00012 | 0.00006 | MDL | 55 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000011 – 0.0002 | 0.0001 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000045 – 0.000078 | 0.000039 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-6
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000052 – 0.00009 | 0.000045 | MDL | 650 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000056 – 0.000096 | 0.000048 | MDL | 35 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.000025 | 0.0000125 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000004 – 0.000069 | 0.0000345 | MDL | 65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000026 – 0.000045 | 0.0000225 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | 0.00099 | J | 0.0028 | J | mg/kg | -3B (BURN AREA) (4/9/200 | 0.5 – 2 | 2/14 | 14% | 0.00000072 – 0.00011 | 0.0028 | MDC | 8.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000044 – 0.000075 | 0.0000375 | MDL | 490 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000055 – 0.000095 | 0.0000475 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000032 – 0.000054 | 0.000027 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000042 – 0.000072 | 0.000036 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000059 – 0.0001 | 0.00005 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000052 – 0.00009 | 0.000045 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000004 – 0.000069 | 0.0000345 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00009 | MDL | 4.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000055 – 0.00018 | 0.00009 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000031 – 0.00018 | 0.00009 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000061 – 0.00018 | 0.00009 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000094 – 0.00018 | 0.00009 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000056 – 0.00089 | 0.000445 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000042 – 0.00018 | 0.00009 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000042 – 0.00018 | 0.00009 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000051 – 0.00018 | 0.00009 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000031 – 0.00018 | 0.00009 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.000029 | 0.0000145 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000036 – 0.00018 | 0.00009 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00009 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000045 – 0.00018 | 0.00009 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000052 – 0.00018 | 0.00009 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000035 – 0.00022 | 0.00011 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000028 – 0.00018 | 0.00009 | MDL | 63 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000032 – 0.00089 | 0.000445 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000019 – 0.00018 | 0.00009 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000046 – 0.00018 | 0.00009 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00009 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.00018 | 0.00009 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000025 – 0.00018 | 0.00009 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00005 – 0.00089 | 0.000445 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.000023 | 0.0000115 | MDL | 360 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.00012 | 0.00006 | MDL | 360 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-6
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00009 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | 0.0168 | J | 0.0222 | J | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 3/14 | 21% | 0.000014 – 0.000022 | 0.0222 | MDC | 1800 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000032 – 0.00018 | 0.00009 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00013 – 0.00018 | 0.00009 | MDL | 170 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | 0.017 | J | 0.114 | | mg/kg | Multiple Locations | N/A | 6/14 | 43% | 0.000017 – 0.000022 | 0.114 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(a)pyrene | 50-32-8 | 0.01 | J | 0.117 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 4/14 | 29% | 0.000013 – 0.000022 | 0.117 | MDC | 0.11 | | RSL | Yes | MDC > SL |
| Benzo(b)fluoranthene | 205-99-2 | 0.015 | J | 0.133 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 4/14 | 29% | 0.000017 – 0.000022 | 0.133 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | 0.01 | J | 0.085 | J | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 6/14 | 43% | 0.00002 – 0.000025 | 0.085 | MDC | 180 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | 0.0857 | | 0.107 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 3/14 | 21% | 0.000017 – 0.000034 | 0.107 | MDC | 11 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000024 – 0.00018 | 0.00009 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00009 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000027 – 0.00018 | 0.00009 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0525 | J | 0.199 | | mg/kg | -4B (BURN AREA) (4/9/200 | 0.5 – 2 | 5/14 | 36% | 0.000047 – 0.00016 | 0.199 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000028 – 0.00018 | 0.00009 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000035 – 0.00018 | 0.00009 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.00018 | 0.00009 | MDL | 240 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | 0.0191 | J | 0.117 | | mg/kg | Multiple Locations | N/A | 5/14 | 36% | 0.000014 – 0.00002 | 0.117 | MDC | 110 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | 0.0226 | J | 0.024 | J | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 2/14 | 14% | 0.000017 – 0.000024 | 0.024 | MDC | 0.11 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.00018 | 0.00009 | MDL | 7.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000016 – 0.00018 | 0.00009 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000016 – 0.00018 | 0.00009 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00009 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000031 – 0.00018 | 0.00009 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | 0.023 | J | 0.176 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 7/14 | 50% | 0.000013 – 0.00002 | 0.176 | MDC | 240 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.000022 | 0.000011 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000021 – 0.00018 | 0.00009 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000026 – 0.00089 | 0.000445 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00009 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.0613 | J | 0.0643 | J | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 3/14 | 21% | 0.000017 – 0.000029 | 0.0643 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00009 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000026 – 0.00018 | 0.00009 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00009 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.00018 | 0.00009 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000041 – 0.00036 | 0.00018 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | 0.0256 | J | 0.0831 | | mg/kg | -7A (BURN AREA) (4/10/20 | 0 – 0.5 | 4/14 | 29% | 0.000016 – 0.000022 | 0.0831 | MDC | 1800 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000045 – 0.00018 | 0.00009 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | 0.0213 | J | 0.159 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 7/14 | 50% | 0.000013 – 0.00002 | 0.159 | MDC | 180 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0013 | J | 0.197 | | mg/kg | -4B (BURN AREA) (4/9/200 | 0.5 – 2 | 7/10 | 70% | 0.00000035 – 0.00000043 | 0.197 | MDC | 0.19 | | RSL | Yes | MDC > SL |
| 4,4'-DDE | 72-55-9 | 0.0053 | | 1.31 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 9/10 | 90% | 0.00000037 – 0.00000037 | 1.31 | MDC | 2 | | RSL | No | 1/2 MDL and MDC ≤ SL |

Table 2-6
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | 0.0063 | | 0.577 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 9/10 | 90% | 0.00000045 – 0.00000045 | 0.577 | MDC | 1.9 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000032 – 0.0000036 | 0.0000018 | MDL | 0.039 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000027 – 0.000003 | 0.0000015 | MDL | 0.086 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | 0.0267 | | 0.0267 | | mg/kg | -3B (BURN AREA) (4/9/200 | 0.5 – 2 | 1/10 | 10% | 0.0000004 – 0.0000044 | 0.0267 | MDC | 1.7 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000032 – 0.0000035 | 0.00000175 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000054 – 0.000006 | 0.000003 | MDL | 0.3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000037 – 0.0000041 | 0.00000205 | MDL | 0.034 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000004 – 0.0000044 | 0.0000022 | MDL | 38 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000039 – 0.0000044 | 0.0000022 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000039 – 0.0000043 | 0.00000215 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000037 – 0.000004 | 0.000002 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000035 – 0.0000038 | 0.0000019 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000004 – 0.0000045 | 0.00000225 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000003 – 0.0000033 | 0.00000165 | MDL | 0.57 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | 0.0346 | | 0.0346 | | mg/kg | -3B (BURN AREA) (4/9/200 | 0.5 – 2 | 1/10 | 10% | 0.0000004 – 0.0000044 | 0.0346 | MDC | 1.7 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000038 – 0.0000042 | 0.0000021 | MDL | 0.13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000041 – 0.0000045 | 0.00000225 | MDL | 0.07 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000049 – 0.0000054 | 0.0000027 | MDL | 32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000007 – 0.000077 | 0.0000385 | MDL | 0.49 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000069 – 0.0000084 | 0.0000042 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000022 – 0.000027 | 0.0000135 | MDL | 0.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00002 – 0.000024 | 0.000012 | MDL | 0.17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000012 – 0.000014 | 0.000007 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000013 – 0.000015 | 0.0000075 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000017 – 0.000021 | 0.0000105 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | 0.213 | | 0.213 | | mg/kg | -3B (BURN AREA) (4/9/200 | 0.5 – 2 | 1/10 | 10% | 0.0000074 – 0.000009 | 0.213 | MDC | 0.24 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dioxins and Furans | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.000208 | | 0.000289 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.000289 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.0000412 | J | 0.0000454 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000454 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | 0.0000033 | J | 0.00000332 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000332 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | 0.0000046 | | 0.00000571 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000571 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | 0.00001 | | 0.0000108 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000108 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000975 | | 0.0000129 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000129 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | 0.00000948 | | 0.00000964 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000964 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.00000883 | | 0.0000116 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000116 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | 0.00000279 | J | 0.0000028 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000028 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | 0.00000721 | | 0.0000079 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000079 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | 0.00000446 | | 0.00000516 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000516 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | 0.0000128 | | 0.000013 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.000013 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |

Table 2-6
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,4,7,8-PECDF | 57117-31-4 | 0.0000137 | | 0.0000139 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000139 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-TCDD | 1746-01-6 | 0.0000012 | | 0.00000138 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000138 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.0000127 | | 0.0000141 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000141 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDD | 3268-87-9 | 0.00895 | J | 0.0126 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0126 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDF | 39001-02-0 | 0.000022 | | 0.0000241 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000241 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0000225 | | 0.0000258 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000258 | MDC | 0.0000048 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.23 – 0.32 | 0.16 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7060 | | 38600 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 38600 | MDC | 7700 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | 2.8 | J | 63.7 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 9/14 | 64% | 0.82 – 0.97 | 63.7 | MDC | 3.1 | | RSL | Yes | MDC > SL |
| Arsenic | 7440-38-2 | 3 | | 8.4 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 8.4 | MDC | 0.68 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 32.2 | | 1160 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 1160 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.086 | B | 0.4 | B | mg/kg | SB-3B (4/18/2007) | 0.5 – 2 | 9/14 | 64% | 0.022 – 0.14 | 0.4 | MDC | 16 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Cadmium | 7440-43-9 | 0.21 | B | 21.6 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 13/14 | 93% | 0.16 – 0.16 | 21.6 | MDC | 7.1 | | RSL | Yes | MDC > SL |
| Calcium | 7440-70-2 | 234 | B | 12700 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 12700 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 8 | | 616 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 616 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 2.5 | B | 15 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 15 | MDC | 2.3 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 5.3 | | 5100 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 5100 | MDC | 310 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 5970 | | 160000 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 160000 | MDC | 5500 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | 5.4 | | 2120 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 2120 | MDC | 200 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 699 | | 2580 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 2580 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 148 | | 1490 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 1490 | MDC | 180 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.04 | | 1.8 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 1.8 | MDC | 1.1 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Nickel | 7440-02-0 | 4.8 | | 132 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 132 | MDC | 150 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 292 | B | 1410 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 1410 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 0.93 | B | 4.4 | B | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 2/14 | 14% | 0.76 – 8.8 | 4.4 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Silver | 7440-22-4 | 0.18 | B | 84.5 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 10/14 | 71% | 0.17 – 0.3 | 84.5 | MDC | 39 | | RSL | Yes | MDC > SL |
| Sodium | 7440-23-5 | 63 | J | 215 | B | mg/kg | -3B (BURN AREA) (4/9/200 | 0.5 – 2 | 7/14 | 50% | 85 – 190 | 215 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.045 | B | 0.15 | B | mg/kg | SB-3B (4/18/2007) | 0.5 – 2 | 5/14 | 36% | 0.043 – 1.6 | 0.15 | MDC | 0.078 | | RSL | Yes | MDC > SL |
| Vanadium | 7440-62-2 | 11 | | 51 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 51 | MDC | 39 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 16.4 | | 4280 | | mg/kg | -3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 4280 | MDC | 2300 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration

Table 2-6
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits (1) | Screening Concentration | Screening Level (2, 3) | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-7
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000008 – 0.0000076 | 0.0000038 | MDL | 810 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000077 – 0.0000076 | 0.0000038 | MDL | 0.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000072 – 0.0000076 | 0.0000038 | MDL | 0.15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000012 – 0.0000076 | 0.0000038 | MDL | 670 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000064 – 0.0000076 | 0.0000038 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000092 – 0.0000076 | 0.0000038 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000047 – 0.0000076 | 0.0000038 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000029 – 0.0000076 | 0.0000038 | MDL | 0.0053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000076 – 0.0000076 | 0.0000038 | MDL | 0.036 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000061 – 0.0000076 | 0.0000038 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000073 – 0.0000076 | 0.0000038 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000075 – 0.0000076 | 0.0000038 | MDL | 1.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000066 – 0.0000076 | 0.0000038 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000062 – 0.0000076 | 0.0000038 | MDL | 2.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | 0.0079 | J | 0.025 | | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 3/12 | 25% | 0.0000037 – 0.000014 | 0.025 | MDC | 2700 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000018 – 0.000015 | 0.0000075 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000027 – 0.000015 | 0.0000075 | MDL | 3300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | 0.022 | | 0.084 | | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 6/12 | 50% | 0.0000038 – 0.000011 | 0.084 | MDC | 6100 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | 0.0011 | J | 0.0024 | | mg/kg | -3C (BURN AREA) (4/9/20 | 4 – 5 | 2/12 | 17% | 0.0000036 – 0.0000076 | 0.0024 | MDC | 1.2 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000061 – 0.0000076 | 0.0000038 | MDL | 0.29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000058 – 0.0000076 | 0.0000038 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000005 – 0.0000076 | 0.0000038 | MDL | 0.68 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000074 – 0.0000076 | 0.0000038 | MDL | 77 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000013 – 0.0000076 | 0.0000038 | MDL | 0.65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000058 – 0.0000076 | 0.0000038 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000023 – 0.0000076 | 0.0000038 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000078 – 0.0000076 | 0.0000038 | MDL | 0.32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000062 – 0.0000076 | 0.0000038 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000009 – 0.0000076 | 0.0000038 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000056 – 0.0000076 | 0.0000038 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000017 – 0.0000076 | 0.0000038 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000074 – 0.0000076 | 0.0000038 | MDL | 8.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000011 – 0.0000076 | 0.0000038 | MDL | 8.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000061 – 0.0000076 | 0.0000038 | MDL | 5.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000027 – 0.0002 | 0.0001 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000063 – 0.0000076 | 0.0000038 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000012 – 0.0000015 | 0.00000075 | MDL | 55 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000019 – 0.0000076 | 0.0000038 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000075 – 0.0000076 | 0.0000038 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-7
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000087 – 0.0000076 | 0.0000038 | MDL | 650 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | 0.0026 | J | 0.0029 | J | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 2/12 | 17% | 0.00000093 – 0.0000076 | 0.0029 | MDC | 35 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000019 – 0.000024 | 0.000012 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000066 – 0.00000084 | 0.00000042 | MDL | 65 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000044 – 0.0000076 | 0.0000038 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | 0.0093 | | 0.0137 | | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 2/12 | 17% | 0.0000036 – 0.0000076 | 0.0137 | MDC | 8.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Toluene | 108-88-3 | 0.0022 | J | 0.0022 | J | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 1/12 | 8% | 0.00000073 – 0.0000076 | 0.0022 | MDC | 490 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000092 – 0.0000076 | 0.0000038 | MDL | 7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000053 – 0.0000076 | 0.0000038 | MDL | 1.8 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0000007 – 0.0000076 | 0.0000038 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000098 – 0.0000076 | 0.0000038 | MDL | 2300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000087 – 0.0000076 | 0.0000038 | MDL | 0.059 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00000066 – 0.000015 | 0.0000075 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00002 – 0.0002 | 0.0001 | MDL | 4.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000061 – 0.0002 | 0.0001 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000034 – 0.0002 | 0.0001 | MDL | 6.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000068 – 0.0002 | 0.0001 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.0001 – 0.0002 | 0.0001 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000062 – 0.00098 | 0.00049 | MDL | 13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000048 – 0.0002 | 0.0001 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000047 – 0.0002 | 0.0001 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000057 – 0.0002 | 0.0001 | MDL | 480 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000035 – 0.0002 | 0.0001 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | 0.024 | J | 0.024 | J | mg/kg | Multiple Locations | N/A | 2/12 | 17% | 0.000019 – 0.000027 | 0.024 | MDC | 24 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00004 – 0.0002 | 0.0001 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000026 – 0.0002 | 0.0001 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000051 – 0.0002 | 0.0001 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000059 – 0.0002 | 0.0001 | MDL | 320 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000039 – 0.00024 | 0.00012 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000032 – 0.0002 | 0.0001 | MDL | 63 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000036 – 0.00098 | 0.00049 | MDL | 0.51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000021 – 0.0002 | 0.0001 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000052 – 0.0002 | 0.0001 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000025 – 0.0002 | 0.0001 | MDL | 2.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000019 – 0.0002 | 0.0001 | MDL | 16 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000028 – 0.0002 | 0.0001 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000056 – 0.00098 | 0.00049 | MDL | 13 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | 0.042 | J | 0.042 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000019 – 0.000024 | 0.042 | MDC | 360 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Acenaphthylene | 208-96-8 | 0.066 | J | 0.066 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000017 – 0.000024 | 0.066 | MDC | 360 | * | RSL | No | 1/2 MDL and MDC ≤ SL |

Table 2-7
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000026 – 0.0002 | 0.0001 | MDL | 780 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | 0.16 | J | 0.16 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000016 – 0.000024 | 0.16 | MDC | 1800 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000035 – 0.0002 | 0.0001 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | 0.045 | J | 0.045 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/10 | 10% | 0.00015 – 0.0002 | 0.045 | MDC | 170 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(a)anthracene | 56-55-3 | 0.028 | J | 0.13 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 2/12 | 17% | 0.000019 – 0.000024 | 0.13 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(a)pyrene | 50-32-8 | 0.044 | J | 0.27 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 2/12 | 17% | 0.000014 – 0.000024 | 0.27 | MDC | 0.11 | | RSL | Yes | MDC > SL |
| Benzo(b)fluoranthene | 205-99-2 | 0.65 | | 0.65 | | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000019 – 0.000024 | 0.65 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | 0.3 | J | 0.3 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000019 – 0.000024 | 0.3 | MDC | 180 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | 0.26 | J | 0.26 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000019 – 0.000031 | 0.26 | MDC | 11 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000026 – 0.0002 | 0.0001 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00002 – 0.0002 | 0.0001 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000031 – 0.0002 | 0.0001 | MDL | 310 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0796 | J | 0.19 | J | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 4/12 | 33% | 0.00015 – 0.0002 | 0.19 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000031 – 0.0002 | 0.0001 | MDL | 290 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000039 – 0.0002 | 0.0001 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | 0.04 | J | 0.04 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000017 – 0.0002 | 0.04 | MDC | 240 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Chrysene | 218-01-9 | 0.014 | J | 0.16 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 2/12 | 17% | 0.000015 – 0.000024 | 0.16 | MDC | 110 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000019 – 0.000024 | 0.000012 | MDL | 0.11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | 0.028 | J | 0.028 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000019 – 0.0002 | 0.028 | MDC | 7.8 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000018 – 0.0002 | 0.0001 | MDL | 5100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000018 – 0.0002 | 0.0001 | MDL | 5100 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000026 – 0.0002 | 0.0001 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000035 – 0.0002 | 0.0001 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | 0.013 | J | 0.45 | | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 6/12 | 50% | 0.000015 – 0.000022 | 0.45 | MDC | 240 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluorene | 86-73-7 | 0.038 | J | 0.038 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000016 – 0.000024 | 0.038 | MDC | 240 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000024 – 0.0002 | 0.0001 | MDL | 0.21 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000029 – 0.00098 | 0.00049 | MDL | 0.18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00002 – 0.0002 | 0.0001 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.35 | J | 0.35 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 1/12 | 8% | 0.000019 – 0.000026 | 0.35 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.00002 – 0.0002 | 0.0001 | MDL | 570 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000029 – 0.0002 | 0.0001 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000026 – 0.0002 | 0.0001 | MDL | 0.078 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000017 – 0.0002 | 0.0001 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000046 – 0.00039 | 0.000195 | MDL | 1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | 0.024 | J | 0.21 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 4/12 | 33% | 0.000018 – 0.000023 | 0.21 | MDC | 1800 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.000051 – 0.0002 | 0.0001 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | 0.022 | J | 0.43 | | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 3/12 | 25% | 0.000014 – 0.000022 | 0.43 | MDC | 180 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0033 | | 0.0062 | | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 2/2 | 100% | N/A | 0.0062 | MDC | 0.19 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| 4,4'-DDE | 72-55-9 | 0.0213 | J | 0.0532 | J | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 2/2 | 100% | N/A | 0.0532 | MDC | 2 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Table 2-7
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | 0.007 | J | 0.0183 | J | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 2/2 | 100% | N/A | 0.0183 | MDC | 1.9 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000036 – 0.00000037 | 1.85E-07 | MDL | 0.039 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000003 – 0.00000031 | 1.55E-07 | MDL | 0.086 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000044 – 0.00000046 | 0.00000023 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000035 – 0.00000037 | 1.85E-07 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000006 – 0.00000062 | 0.00000031 | MDL | 0.3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000041 – 0.00000043 | 2.15E-07 | MDL | 0.034 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000044 – 0.00000046 | 0.00000023 | MDL | 38 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000044 – 0.00000045 | 2.25E-07 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000043 – 0.00000045 | 2.25E-07 | MDL | 47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000041 – 0.00000042 | 0.00000021 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000038 – 0.0000004 | 0.0000002 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000045 – 0.00000046 | 0.00000023 | MDL | 1.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000033 – 0.00000034 | 0.00000017 | MDL | 0.57 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000044 – 0.00000045 | 2.25E-07 | MDL | 1.7 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000042 – 0.00000044 | 0.00000022 | MDL | 0.13 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000045 – 0.00000047 | 2.35E-07 | MDL | 0.07 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.00000056 | 0.00000028 | MDL | 32 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000078 – 0.0000081 | 0.00000405 | MDL | 0.49 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000077 – 0.000008 | 0.000004 | MDL | 0.41 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000025 | 0.0000125 | MDL | 0.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.000023 | 0.0000115 | MDL | 0.17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000013 – 0.000013 | 0.0000065 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000015 | 0.0000075 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.00002 | 0.00001 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000082 – 0.0000085 | 0.00000425 | MDL | 0.24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dioxins and Furans | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.0000466 | J | 0.0000595 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000595 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.00000911 | | 0.0000144 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000144 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000323 – 0.00000327 | 1.635E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000323 – 0.00000327 | 1.635E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | 0.00000179 | J | 0.00000179 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/2 | 50% | 0.00000327 – 0.00000327 | 0.00000179 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000223 | J | 0.00000223 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/2 | 50% | 0.00000327 – 0.00000327 | 0.00000223 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000323 – 0.00000327 | 1.635E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.00000183 | J | 0.0000022 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000022 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000323 – 0.00000327 | 1.635E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000323 – 0.00000327 | 1.635E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000323 – 0.00000327 | 1.635E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | 0.00000204 | J | 0.00000204 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/2 | 50% | 0.00000327 – 0.00000327 | 0.00000204 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |

Table 2-7
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,4,7,8-PECDF | 57117-31-4 | 0.00000165 | J | 0.00000169 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.00000169 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000000645 – 0.000000652 | 3.26E-07 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.0000023 | J | 0.0000025 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000025 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDD | 3268-87-9 | 0.00296 | J | 0.00375 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.00375 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDF | 39001-02-0 | 0.0000064 | J | 0.0000103 | | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000103 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.00000387 | | 0.00000469 | | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.00000469 | MDC | 0.0000048 | * | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.28 – 0.28 | 0.14 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 6400 | B | 79300 | J | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 12/12 | 100% | N/A | 79300 | MDC | 7700 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | 0.73 | J | 510 | | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 10/12 | 83% | 0.83 – 4.4 | 510 | MDC | 3.1 | | RSL | Yes | MDC > SL |
| Arsenic | 7440-38-2 | 2.6 | J | 52 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 52 | MDC | 0.68 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 21 | | 1110 | | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 12/12 | 100% | N/A | 1110 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.19 | J | 0.58 | J | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 8/12 | 67% | 0.025 – 0.65 | 0.58 | MDC | 16 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Cadmium | 7440-43-9 | 0.027 | J | 75.3 | J | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 12/12 | 100% | N/A | 75.3 | MDC | 7.1 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Calcium | 7440-70-2 | 790 | | 20000 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 11/12 | 92% | 150 – 750 | 20000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 8.6 | | 140 | J | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 12/12 | 100% | N/A | 140 | MDC | 0.3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 2.5 | J | 28 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 28 | MDC | 2.3 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 6.5 | | 6700 | B | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 12/12 | 100% | N/A | 6700 | MDC | 310 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 8900 | | 250000 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 250000 | MDC | 5500 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | 6 | | 22000 | | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 12/12 | 100% | N/A | 22000 | MDC | 200 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 610 | J | 2500 | J | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 12/12 | 100% | N/A | 2500 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 140 | | 1600 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 1600 | MDC | 180 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.01 | J | 0.33 | | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 11/12 | 92% | 0.048 – 0.048 | 0.33 | MDC | 1.1 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Nickel | 7440-02-0 | 6.4 | J | 120 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 120 | MDC | 150 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 410 | J | 935 | B | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 8/12 | 67% | 130 – 800 | 935 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 1.2 | J | 1.5 | B | mg/kg | Multiple Locations | N/A | 3/12 | 25% | 0.86 – 5 | 1.5 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Silver | 7440-22-4 | 4.3 | | 45.5 | | mg/kg | -3C (BURN AREA) (4/9/200 | 4 – 5 | 9/12 | 75% | 0.27 – 1.5 | 45.5 | MDC | 39 | | RSL | Yes | MDC > SL |
| Sodium | 7440-23-5 | 46 | J | 410 | J | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 7/12 | 58% | 96 – 800 | 410 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/12 | 0% | 0.048 – 8 | 4 | MDL | 0.078 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Vanadium | 7440-62-2 | 9.2 | J | 25 | | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 12/12 | 100% | N/A | 25 | MDC | 39 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 20 | | 5400 | | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 12/12 | 100% | N/A | 5400 | MDC | 2300 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit

Table 2-7
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits (1) | Screening Concentration | Screening Level (2, 3) | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-8
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Upgradient Drainage; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000065 – 0.0000027 | 0.00000135 | MDL | 8100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000063 – 0.0000027 | 0.00000135 | MDL | 6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000059 – 0.0000025 | 0.00000125 | MDL | 1.5 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000094 – 0.000004 | 0.000002 | MDL | 6700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000053 – 0.0000022 | 0.0000011 | MDL | 36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000075 – 0.0000032 | 0.0000016 | MDL | 230 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000038 – 0.0000016 | 0.0000008 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000024 – 0.00001 | 0.000005 | MDL | 0.053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000062 – 0.0000026 | 0.0000013 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000005 – 0.0000021 | 0.00000105 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000006 – 0.0000025 | 0.00000125 | MDL | 4.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000061 – 0.0000026 | 0.0000013 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.0000023 | 0.00000115 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000005 – 0.0000021 | 0.00000105 | MDL | 26 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | 0.0388 | J | 0.0388 | J | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.000003 – 0.000003 | 0.0388 | MDC | 27000 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000015 – 0.0000063 | 0.00000315 | MDL | 200 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000022 – 0.0000092 | 0.0000046 | MDL | 33000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | 0.0579 | | 0.0579 | | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.0000031 – 0.0000031 | 0.0579 | MDC | 61000 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000053 – 0.0000022 | 0.0000011 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000005 – 0.0000021 | 0.00000105 | MDL | 2.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000048 – 0.000002 | 0.000001 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000004 – 0.0000017 | 0.00000085 | MDL | 6.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | 0.0096 | J | 0.0096 | J | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.00000061 – 0.00000061 | 0.0096 | MDC | 770 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000001 – 0.0000044 | 0.0000022 | MDL | 6.5 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000047 – 0.000002 | 0.000001 | MDL | 280 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000019 – 0.0000081 | 0.00000405 | MDL | 14000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000064 – 0.0000027 | 0.00000135 | MDL | 3.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000051 – 0.0000021 | 0.00000105 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000074 – 0.0000031 | 0.00000155 | MDL | 160 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000045 – 0.0000019 | 0.00000095 | MDL | 18 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000014 – 0.0000059 | 0.00000295 | MDL | 6500 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000006 – 0.0000025 | 0.00000125 | MDL | 83 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000087 – 0.0000037 | 0.00000185 | MDL | 87 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000049 – 0.0000021 | 0.00000105 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.000072 | 0.000036 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000051 – 0.0000022 | 0.0000011 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000096 – 0.0000041 | 0.00000205 | MDL | 550 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000015 – 0.0000065 | 0.00000325 | MDL | 78000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000061 – 0.0000026 | 0.0000013 | MDL | 470 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-8
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Upgradient Drainage; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000071 – 0.000003 | 0.0000015 | MDL | 6500 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000076 – 0.0000032 | 0.0000016 | MDL | 350 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.000062 | 0.000031 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.0000023 | 0.00000115 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000036 – 0.0000015 | 0.00000075 | MDL | 6000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000009 – 0.0000038 | 0.0000019 | MDL | 81 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000059 – 0.0000025 | 0.00000125 | MDL | 4900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000075 – 0.0000032 | 0.0000016 | MDL | 70 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000043 – 0.0000018 | 0.0000009 | MDL | 18 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000057 – 0.0000024 | 0.0000012 | MDL | 4.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000008 – 0.0000034 | 0.0000017 | MDL | 23000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000071 – 0.000003 | 0.0000015 | MDL | 0.59 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.0000023 | 0.00000115 | MDL | 580 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000053 | 0.0000265 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00006 – 0.00016 | 0.00008 | MDL | 6300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000033 – 0.000092 | 0.000046 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000066 – 0.00018 | 0.00009 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0001 – 0.00028 | 0.00014 | MDL | 1300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000061 – 0.00017 | 0.000085 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000046 – 0.00013 | 0.000065 | MDL | 17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000045 – 0.00012 | 0.00006 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000056 – 0.00015 | 0.000075 | MDL | 4800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000034 – 0.000094 | 0.000047 | MDL | 390 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.000071 | 0.0000355 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000039 – 0.00011 | 0.000055 | MDL | 3200 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000069 | 0.0000345 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000049 – 0.00014 | 0.00007 | MDL | 130 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000057 – 0.00016 | 0.00008 | MDL | 3200 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000038 – 0.0001 | 0.00005 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000031 – 0.000085 | 0.0000425 | MDL | 630 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000035 – 0.000095 | 0.0000475 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000056 | 0.000028 | MDL | 160 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000051 – 0.00014 | 0.00007 | MDL | 6300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000068 | 0.000034 | MDL | 27 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000052 | 0.000026 | MDL | 160 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000027 – 0.000076 | 0.000038 | MDL | 250 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000054 – 0.00015 | 0.000075 | MDL | 130 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000056 | 0.000028 | MDL | 3600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000044 | 0.000022 | MDL | 3600 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-8
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Upgradient Drainage; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000069 | 0.0000345 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000015 – 0.000042 | 0.000021 | MDL | 18000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000034 – 0.000095 | 0.0000475 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000053 | 0.0000265 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000038 | 0.000019 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000018 – 0.00005 | 0.000025 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.00006 | 0.00003 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00003 – 0.000083 | 0.0000415 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.000071 | 0.0000355 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000055 | 0.0000275 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00003 – 0.000082 | 0.000041 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.161 | | 0.161 | | mg/kg | SD-10 (5/2/2007) | N/A | 1/2 | 50% | 0.00014 – 0.00014 | 0.161 | MDC | 390 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00003 – 0.000083 | 0.0000415 | MDL | 2900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000038 – 0.00011 | 0.000055 | MDL | 31000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000044 | 0.000022 | MDL | 2400 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000015 – 0.00004 | 0.00002 | MDL | 1100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000021 – 0.000057 | 0.0000285 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000051 | 0.0000255 | MDL | 78 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000047 | 0.0000235 | MDL | 51000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000047 | 0.0000235 | MDL | 51000 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.00007 | 0.000035 | MDL | 6300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000034 – 0.000094 | 0.000047 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000039 | 0.0000195 | MDL | 2400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000044 | 0.000022 | MDL | 2400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000023 – 0.000063 | 0.0000315 | MDL | 2.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000029 – 0.000079 | 0.0000395 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000055 | 0.0000275 | MDL | 18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.00007 | 0.000035 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000054 | 0.000027 | MDL | 5700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000028 – 0.000076 | 0.000038 | MDL | 51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.00007 | 0.000035 | MDL | 0.78 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000045 | 0.0000225 | MDL | 1100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000045 – 0.00012 | 0.00006 | MDL | 10 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000048 | 0.000024 | MDL | 18000 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000049 – 0.00014 | 0.00007 | MDL | 19000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000038 | 0.000019 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.065 | | 0.065 | | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.0000016 – 0.0000016 | 0.065 | MDC | 1.9 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 4,4'-DDE | 72-55-9 | 0.0268 | | 0.149 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.149 | MDC | 20 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| 4,4'-DDT | 50-29-3 | 0.0108 | | 0.0108 | | mg/kg | SD-10 (5/2/2007) | N/A | 1/2 | 50% | 0.000013 – 0.000013 | 0.0108 | MDC | 19 | | RSL | No | 1/2 MDL and MDC ≤ SL |

Table 2-8
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Upgradient Drainage; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 0.39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 0.86 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 17 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 0.34 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 380 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 470 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 470 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 19 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000004 – 0.000033 | 0.0000165 | MDL | 19 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 5.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 17 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 1.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.0000065 | MDL | 0.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000004 – 0.000033 | 0.0000165 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.00016 | 0.00008 | MDL | 4.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000075 – 0.000062 | 0.000031 | MDL | 4.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000024 – 0.0002 | 0.0001 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.00018 | 0.00009 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000013 – 0.0001 | 0.00005 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.00011 | 0.000055 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.00015 | 0.000075 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000008 – 0.000066 | 0.000033 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.28 – 0.68 | 0.34 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7770 | | 17600 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 17600 | MDC | 77000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | 2.8 | | 2.8 | | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.88 – 0.88 | 2.8 | MDC | 31 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Arsenic | 7440-38-2 | 3 | J | 13.3 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 13.3 | MDC | 6.8 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 30.2 | | 85.2 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 85.2 | MDC | 15000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.2 | B | 0.61 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.61 | MDC | 160 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Cadmium | 7440-43-9 | 1.2 | | 1.5 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 1.5 | MDC | 71 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Calcium | 7440-70-2 | 468 | BJ | 3970 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 3970 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 8.6 | J | 27.5 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 27.5 | MDC | 3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 2 | B | 4.2 | B | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 4.2 | MDC | 23 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 26.6 | | 56.5 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 56.5 | MDC | 3100 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 5670 | J | 19400 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 19400 | MDC | 55000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Table 2-8
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Upgradient Drainage; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 7439-92-1 | 22.2 | J | 96.9 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 96.9 | MDC | 2000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 541 | B | 3720 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 3720 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 82.6 | J | 111 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 111 | MDC | 1800 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.069 | B | 0.49 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.49 | MDC | 11 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Nickel | 7440-02-0 | 5.6 | J | 18.5 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 18.5 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 332 | B | 1300 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 1300 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 1.7 | B | 1.7 | B | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.91 – 0.91 | 1.7 | MDC | 390 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Silver | 7440-22-4 | 0.65 | B | 1.5 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 1.5 | MDC | 390 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Sodium | 7440-23-5 | 162 | B | 2690 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 2690 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.079 | B | 0.12 | B | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.12 | MDC | 0.78 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Vanadium | 7440-62-2 | 12.7 | | 31.6 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 31.6 | MDC | 390 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 71.6 | J | 324 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 324 | MDC | 23000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:
% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against 10 x USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-9
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000002 – 0.000027 | 0.0000135 | MDL | 8100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000019 – 0.000027 | 0.0000135 | MDL | 6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.0000135 | MDL | 1.5 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000028 – 0.000027 | 0.0000135 | MDL | 6700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000027 | 0.0000135 | MDL | 36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000023 – 0.000027 | 0.0000135 | MDL | 230 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000012 – 0.000027 | 0.0000135 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000071 – 0.000027 | 0.0000135 | MDL | 0.053 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000019 – 0.000027 | 0.0000135 | MDL | 0.36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.0000135 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.0000135 | MDL | 4.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.0000135 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000027 | 0.0000135 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.0000135 | MDL | 26 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | 0.025 | J | 0.164 | | mg/kg | SD-8 (5/2/2007) | N/A | 8/19 | 42% | 0.000009 – 0.000054 | 0.164 | MDC | 27000 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000045 – 0.000054 | 0.000027 | MDL | 200 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000066 – 0.000054 | 0.000027 | MDL | 33000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | 0.028 | J | 0.33 | J | mg/kg | SD13 (8/23/2016) | 0 – 0.5 | 15/19 | 79% | 0.000018 – 0.000044 | 0.33 | MDC | 61000 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000027 | 0.0000135 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.0000135 | MDL | 2.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000014 – 0.000027 | 0.0000135 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000012 – 0.000027 | 0.0000135 | MDL | 6.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | 0.0084 | J | 0.18 | | mg/kg | SD18 (8/30/2016) | 0 – 0.5 | 16/19 | 84% | 0.0000044 – 0.000023 | 0.18 | MDC | 770 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Carbon tetrachloride | 56-23-5 | 0.03 | J | 0.03 | J | mg/kg | SD21 (8/26/2016) | 0 – 0.5 | 1/19 | 5% | 0.0000031 – 0.000027 | 0.03 | MDC | 6.5 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000014 – 0.000027 | 0.0000135 | MDL | 280 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000057 – 0.000027 | 0.0000135 | MDL | 14000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000019 – 0.000027 | 0.0000135 | MDL | 3.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.0000135 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000022 – 0.000027 | 0.0000135 | MDL | 160 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000014 – 0.000027 | 0.0000135 | MDL | 18 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | 0.0145 | J | 0.0218 | J | mg/kg | SD-4 (5/2/2007) | N/A | 2/19 | 11% | 0.0000042 – 0.000027 | 0.0218 | MDC | 6500 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.0000135 | MDL | 83 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000026 – 0.000027 | 0.0000135 | MDL | 87 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.0000135 | MDL | 58 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00006 – 0.0017 | 0.00085 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.0000135 | MDL | 1900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.0000029 – 0.00001 | 0.000005 | MDL | 550 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000046 – 0.000027 | 0.0000135 | MDL | 78000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.0000135 | MDL | 470 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-9
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000021 – 0.000027 | 0.0000135 | MDL | 6500 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | 0.0092 | J | 0.0092 | J | mg/kg | SD-4 (5/2/2007) | N/A | 1/19 | 5% | 0.0000023 – 0.000027 | 0.0092 | MDC | 350 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0014 | 0.0007 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.0000016 – 0.0000059 | 0.00000295 | MDL | 650 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000011 – 0.000027 | 0.0000135 | MDL | 6000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000027 – 0.000027 | 0.0000135 | MDL | 81 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.0000135 | MDL | 4900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000023 – 0.000027 | 0.0000135 | MDL | 70 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000013 – 0.000027 | 0.0000135 | MDL | 18 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000017 – 0.000027 | 0.0000135 | MDL | 4.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000024 – 0.000027 | 0.0000135 | MDL | 23000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000021 – 0.000027 | 0.0000135 | MDL | 0.59 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000054 | 0.000027 | MDL | 580 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000044 – 0.0012 | 0.0006 | MDL | 47 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00014 – 0.0038 | 0.0019 | MDL | 6300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000077 – 0.0021 | 0.00105 | MDL | 63 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00015 – 0.0042 | 0.0021 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00023 – 0.0065 | 0.00325 | MDL | 1300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00014 – 0.0038 | 0.0019 | MDL | 130 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00011 – 0.0029 | 0.00145 | MDL | 17 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0001 – 0.0029 | 0.00145 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00013 – 0.0035 | 0.00175 | MDL | 4800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000078 – 0.0022 | 0.0011 | MDL | 390 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0016 | 0.0008 | MDL | 240 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000089 – 0.0025 | 0.00125 | MDL | 3200 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000058 – 0.0016 | 0.0008 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00011 – 0.0031 | 0.00155 | MDL | 130 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00013 – 0.0036 | 0.0018 | MDL | 3200 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000087 – 0.0024 | 0.0012 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000071 – 0.002 | 0.001 | MDL | 630 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000079 – 0.0028 | 0.0014 | MDL | 5.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000046 – 0.0013 | 0.00065 | MDL | 160 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00012 – 0.0032 | 0.0016 | MDL | 6300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000057 – 0.0016 | 0.0008 | MDL | 27 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000043 – 0.0012 | 0.0006 | MDL | 160 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000063 – 0.0017 | 0.00085 | MDL | 250 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00012 – 0.0034 | 0.0017 | MDL | 130 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000047 – 0.0013 | 0.00065 | MDL | 3600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000037 – 0.001 | 0.0005 | MDL | 3600 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-9
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000058 – 0.0016 | 0.0008 | MDL | 7800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000035 – 0.00098 | 0.00049 | MDL | 18000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000079 – 0.0022 | 0.0011 | MDL | 24 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00041 – 0.00057 | 0.000285 | MDL | 1700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000044 – 0.0012 | 0.0006 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000032 – 0.00088 | 0.00044 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000042 – 0.0012 | 0.0006 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0014 | 0.0007 | MDL | 1800 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0019 | 0.00095 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000059 – 0.0016 | 0.0008 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000045 – 0.0013 | 0.00065 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000068 – 0.0019 | 0.00095 | MDL | 3100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 4.36 | | 162 | | mg/kg | SD-5 (4/30/2007) | N/A | 2/19 | 11% | 0.00012 – 0.00057 | 162 | MDC | 390 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000069 – 0.0019 | 0.00095 | MDL | 2900 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000088 – 0.0024 | 0.0012 | MDL | 31000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000037 – 0.001 | 0.0005 | MDL | 2400 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000034 – 0.00093 | 0.000465 | MDL | 1100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000048 – 0.0013 | 0.00065 | MDL | 1.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000042 – 0.0012 | 0.0006 | MDL | 78 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000039 – 0.0011 | 0.00055 | MDL | 51000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000039 – 0.0011 | 0.00055 | MDL | 51000 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000058 – 0.0016 | 0.0008 | MDL | 6300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | 3.08 | | 3.08 | | mg/kg | SD-5 (4/30/2007) | N/A | 1/19 | 5% | 0.000078 – 0.00057 | 3.08 | MDC | 630 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluoranthene | 206-44-0 | 0.017 | J | 0.017 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/19 | 5% | 0.000032 – 0.00089 | 0.017 | MDC | 2400 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000037 – 0.001 | 0.0005 | MDL | 2400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000052 – 0.0015 | 0.00075 | MDL | 2.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/17 | 0% | 0.000065 – 0.0028 | 0.0014 | MDL | 1.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000046 – 0.0013 | 0.00065 | MDL | 18 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0016 | 0.0008 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000045 – 0.0013 | 0.00065 | MDL | 5700 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000064 – 0.0018 | 0.0009 | MDL | 51 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000059 – 0.0016 | 0.0008 | MDL | 0.78 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000038 – 0.001 | 0.0005 | MDL | 1100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0001 – 0.0028 | 0.0014 | MDL | 10 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00004 – 0.0011 | 0.00055 | MDL | 18000 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00011 – 0.0031 | 0.00155 | MDL | 19000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000031 – 0.00087 | 0.000435 | MDL | 1800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 1.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-9
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 0.39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 0.86 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 17 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 3 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 0.34 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 380 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 470 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 470 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 19 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000027 – 0.000072 | 0.000036 | MDL | 19 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 5.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 17 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 1.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.0000145 | MDL | 0.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000027 – 0.000072 | 0.000036 | MDL | 320 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00014 – 0.00036 | 0.00018 | MDL | 4.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000051 – 0.00014 | 0.00007 | MDL | 4.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00016 – 0.00043 | 0.000215 | MDL | 2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00015 – 0.00039 | 0.000195 | MDL | 1.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000086 – 0.00023 | 0.000115 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000093 – 0.00025 | 0.000125 | MDL | 2.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00013 – 0.00034 | 0.00017 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000055 – 0.00015 | 0.000075 | MDL | 2.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dioxins and Furans | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.00000275 | J | 0.000117 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 10/11 | 91% | 0.00000527 – 0.00000527 | 0.000117 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.00000354 | J | 0.00000354 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/11 | 9% | 0.00000407 – 0.00000575 | 0.00000354 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | 0.00000313 | J | 0.00000313 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/11 | 9% | 0.00000407 – 0.00000575 | 0.00000313 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000538 | J | 0.00000538 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/11 | 9% | 0.00000407 – 0.00000575 | 0.00000538 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.0000026 | J | 0.00000817 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 5/11 | 45% | 0.00000429 – 0.00000575 | 0.00000817 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |

Table 2-9
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,4,7,8-PECDF | 57117-31-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000407 – 0.00000575 | 2.875E-06 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.000000811 – 0.00000115 | 5.75E-07 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.000000479 | J | 0.00000147 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 6/11 | 55% | 0.000000856 – 0.00000115 | 0.00000147 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDD | 3268-87-9 | 0.0000327 | | 0.00202 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 11/11 | 100% | N/A | 0.00202 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDF | 39001-02-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00000811 – 0.0000115 | 0.00000575 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.00000251 | | 0.00000602 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 11/11 | 100% | N/A | 0.00000602 | MDC | 0.000048 | * | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.55 – 1.6 | 0.8 | MDL | 23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Total Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 12200 | | 28000 | | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 28000 | MDC | 77000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/16 | 0% | 0.65 – 2.8 | 1.4 | MDL | 31 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Arsenic | 7440-38-2 | 4 | J | 21.3 | J | mg/kg | SD-4D (5/2/2007) | N/A | 19/19 | 100% | N/A | 21.3 | MDC | 6.8 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 24.8 | B | 62 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 62 | MDC | 15000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.21 | B | 0.85 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 16/19 | 84% | 0.24 – 0.41 | 0.85 | MDC | 160 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Cadmium | 7440-43-9 | 0.093 | J | 0.37 | B | mg/kg | SD-2 (5/2/2007) | N/A | 13/19 | 68% | 0.13 – 0.3 | 0.37 | MDC | 71 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Calcium | 7440-70-2 | 2000 | | 30900 | J | mg/kg | SD-4 (5/2/2007) | N/A | 19/19 | 100% | N/A | 30900 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 16.4 | J | 59 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 59 | MDC | 3 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Cobalt | 7440-48-4 | 3 | B | 9.3 | | mg/kg | Multiple Locations | N/A | 19/19 | 100% | N/A | 9.3 | MDC | 23 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Copper | 7440-50-8 | 8.8 | | 21.9 | | mg/kg | SD-2 (5/2/2007) | N/A | 19/19 | 100% | N/A | 21.9 | MDC | 3100 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Iron | 7439-89-6 | 11500 | J | 34000 | | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 34000 | MDC | 55000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | 8.9 | J | 45.3 | J | mg/kg | SD-2 (5/2/2007) | N/A | 19/19 | 100% | N/A | 45.3 | MDC | 2000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Magnesium | 7439-95-4 | 3180 | | 13000 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 13000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 58.3 | J | 290 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 290 | MDC | 1800 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.038 | B | 0.12 | B | mg/kg | Multiple Locations | N/A | 13/19 | 68% | 0.052 – 0.16 | 0.12 | MDC | 11 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Nickel | 7440-02-0 | 8.3 | J | 26 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 26 | MDC | 1500 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Potassium | 7440-09-7 | 1110 | | 7100 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 7100 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 1.4 | B | 3.4 | | mg/kg | SD-5 (4/30/2007) | N/A | 7/19 | 37% | 1.3 – 3 | 3.4 | MDC | 390 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Silver | 7440-22-4 | 0.2 | B | 0.41 | B | mg/kg | SD-6 (4/30/2007) | N/A | 3/19 | 16% | 0.16 – 0.9 | 0.41 | MDC | 390 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Sodium | 7440-23-5 | 2830 | | 53700 | | mg/kg | SD-7 (5/2/2007) | N/A | 19/19 | 100% | N/A | 53700 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 0.15 | B | 0.5 | B | mg/kg | SD-5 (4/30/2007) | N/A | 8/19 | 42% | 2.4 – 4.6 | 0.5 | MDC | 0.78 | | RSL | See DSA | MDC ≤ SL < 1/2 MDL |
| Vanadium | 7440-62-2 | 23.9 | | 77 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 77 | MDC | 390 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Zinc | 7440-66-6 | 36.7 | J | 113 | J | mg/kg | SD-2 (5/2/2007) | N/A | 19/19 | 100% | N/A | 113 | MDC | 23000 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit

Table 2-9
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits (1) | Screening Concentration | Screening Level (2, 3) | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against 10 x USEPA Residential Soil RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-10
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Surface Water)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.3 | 0.15 | MDL | 10000 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.8 | 0.4 | MDL | 0.2 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 0.49 | 0.245 | MDL | 0.55 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.69 – 1.2 | 0.6 | MDL | 10000 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.23 | 0.115 | MDL | 28 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.33 | 0.165 | MDL | 300 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.41 | 0.205 | MDL | 0.071 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.8 – 1.1 | 0.55 | MDL | 0.0033 | | RSLx10 | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.45 – 0.52 | 0.26 | MDL | 0.075 | | RSLx10 | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.2 | 0.1 | MDL | 1000 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.29 – 0.29 | 0.145 | MDL | 9.9 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.24 | 0.12 | MDL | 0.9 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.21 – 0.32 | 0.16 | MDL | 1000 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.17 – 0.24 | 0.12 | MDL | 300 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 2.6 – 2.7 | 1.35 | MDL | 5600 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.94 – 1.3 | 0.65 | MDL | 38 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.1 – 1.4 | 0.7 | MDL | 6300 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 2.4 – 2.9 | 1.45 | MDL | 14000 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Benzene | 71-43-2 | 0.77 | J | 0.77 | J | µg/L | SW-02 (12/19/2007) | N/A | 1/7 | 14% | 0.19 – 0.21 | 0.77 | MDC | 5.8 | | VAWQS HH | No | 1/2 MDL and MDC ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.15 – 0.17 | 0.085 | MDL | 0.95 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Bromoform | 75-25-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.54 | 0.27 | MDL | 7 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.38 | 0.19 | MDL | 100 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | 0.24 | J | 0.24 | J | µg/L | SW-02 (12/19/2007) | N/A | 1/7 | 14% | 0.14 – 0.21 | 0.24 | MDC | 810 | | RSLx10 | No | 1/2 MDL and MDC ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.19 – 0.29 | 0.145 | MDL | 0.4 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.19 – 0.22 | 0.11 | MDL | 100 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.56 – 0.67 | 0.335 | MDL | 21000 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.25 | 0.125 | MDL | 60 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.3 – 0.35 | 0.175 | MDL | 190 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.18 – 0.27 | 0.135 | MDL | 70 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.13 – 0.15 | 0.075 | MDL | 0.27 | * | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 0.85 | 0.425 | MDL | 13000 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.19 – 0.28 | 0.14 | MDL | 0.8 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.75 – 1 | 0.5 | MDL | 200 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.21 | 0.105 | MDL | 68 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.13 – 0.21 | 0.105 | MDL | 0.01 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.54 | 0.27 | MDL | 450 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.42 | 0.21 | MDL | 190 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.6 – 2.1 | 1.05 | MDL | 20000 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.31 | 0.155 | MDL | 140 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-10
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Surface Water)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.18 – 0.5 | 0.25 | MDL | 13000 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.21 – 0.27 | 0.135 | MDL | 20 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | 1 | J | 1 | J | µg/L | SW-04 (12/19/2007) | N/A | 1/7 | 14% | 0.18 – 0.38 | 1 | MDC | 1.2 | | RSLx10 | No | 1/2 MDL and MDC ≤ SL |
| o-Xylene | 95-47-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.31 | 0.155 | MDL | 190 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.2 | 0.1 | MDL | 1200 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.28 | 0.14 | MDL | 10 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.21 | 0.105 | MDL | 57 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 0.42 | 0.21 | MDL | 100 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.17 – 0.2 | 0.1 | MDL | 0.27 | * | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.26 – 0.29 | 0.145 | MDL | 0.6 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.25 – 0.26 | 0.13 | MDL | 5200 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.29 | 0.145 | MDL | 0.022 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.31 | 0.155 | MDL | 10000 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.38 | 0.19 | MDL | 0.83 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.1 – 2.3 | 1.15 | MDL | 300 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 1.5 | 0.75 | MDL | 1.5 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.4 – 1.8 | 0.9 | MDL | 10 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.7 – 1.9 | 0.95 | MDL | 100 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 1.2 | 0.6 | MDL | 10 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.54 – 1 | 0.5 | MDL | 0.049 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 0.66 | 0.33 | MDL | 0.49 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 1.2 | 0.6 | MDL | 800 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.87 – 1.1 | 0.55 | MDL | 30 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | 1.8 | J | 1.8 | J | µg/L | SW-04 (12/19/2007) | N/A | 1/7 | 14% | 0.46 – 0.84 | 1.8 | MDC | 36 | | RSLx10 | No | 1/2 MDL and MDC ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 1.6 | 0.8 | MDL | 930 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 0.78 | 0.39 | MDL | 190 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.5 – 2.1 | 1.05 | MDL | 39 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.1 – 1.5 | 0.75 | MDL | 930 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.97 – 1.4 | 0.7 | MDL | 0.049 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 1.5 | 0.75 | MDL | 190 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.81 – 2.5 | 1.25 | MDL | 2 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.41 | 0.205 | MDL | 40 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.2 – 1.4 | 0.7 | MDL | 500 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.47 | 0.235 | MDL | 3.7 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.29 – 0.51 | 0.255 | MDL | 40 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.59 – 0.85 | 0.425 | MDL | 38 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.95 – 1.7 | 0.85 | MDL | 39 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.25 – 0.41 | 0.205 | MDL | 70 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.31 – 0.45 | 0.225 | MDL | 70 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-10
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Surface Water)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.36 – 0.44 | 0.22 | MDL | 1900 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.33 – 0.47 | 0.235 | MDL | 300 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.18 – 0.31 | 0.155 | MDL | 3 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.42 | 0.21 | MDL | 0.0012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.41 – 0.85 | 0.425 | MDL | 0.00012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.66 – 0.82 | 0.41 | MDL | 0.0012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.36 – 0.5 | 0.25 | MDL | 20 | * | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.47 – 0.74 | 0.37 | MDL | 0.012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 0.77 | 0.385 | MDL | 59 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.6 – 0.74 | 0.37 | MDL | 0.03 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.58 – 0.87 | 0.435 | MDL | 200 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.74 – 0.96 | 0.48 | MDL | 0.32 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.64 – 0.7 | 0.35 | MDL | 0.1 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Caprolactam | 105-60-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.54 | 0.27 | MDL | 9900 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.4 – 0.44 | 0.22 | MDL | 50 | * | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.49 | 0.245 | MDL | 0.12 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.48 – 0.64 | 0.32 | MDL | 0.00012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.23 – 0.4 | 0.2 | MDL | 7.9 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.46 | 0.23 | MDL | 600 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.39 | 0.195 | MDL | 600 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.4 – 0.7 | 0.35 | MDL | 20 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.48 – 0.67 | 0.335 | MDL | 200 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.39 | 0.195 | MDL | 20 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.36 – 0.53 | 0.265 | MDL | 50 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.31 – 0.63 | 0.315 | MDL | 0.000079 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.1 – 0.48 | 0.24 | MDL | 4 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.33 | 0.165 | MDL | 0.1 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.87 | 0.435 | MDL | 0.0012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Isophorone | 78-59-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.49 – 0.69 | 0.345 | MDL | 34 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.47 – 0.77 | 0.385 | MDL | 10 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.38 – 0.55 | 0.275 | MDL | 0.005 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.41 – 0.61 | 0.305 | MDL | 3.3 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.93 – 2.2 | 1.1 | MDL | 0.03 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.43 | 0.215 | MDL | 300 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.56 – 0.75 | 0.375 | MDL | 4000 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.37 – 0.41 | 0.205 | MDL | 20 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0024 – 0.0028 | 0.0014 | MDL | 0.00012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 0.000018 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0049 – 0.0057 | 0.00285 | MDL | 0.00003 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |

Table 2-10
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Surface Water)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aldrin | 309-00-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0033 – 0.0039 | 0.00195 | MDL | 0.00000077 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0026 – 0.003 | 0.0015 | MDL | 0.00036 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0044 – 0.0051 | 0.00255 | MDL | 0.2 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0062 – 0.0072 | 0.0036 | MDL | 0.008 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0031 – 0.0036 | 0.0018 | MDL | 0.008 | * | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.002 | 0.001 | MDL | 0.0000012 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0046 – 0.0054 | 0.0027 | MDL | 20 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0021 – 0.0025 | 0.00125 | MDL | 20 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0032 – 0.0038 | 0.0019 | MDL | 20 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.003 – 0.0035 | 0.00175 | MDL | 0.03 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0064 – 0.0075 | 0.00375 | MDL | 0.03 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0035 – 0.0041 | 0.00205 | MDL | 0.03 | * | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.002 | 0.001 | MDL | 4.2 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.002 | 0.001 | MDL | 0.2 | * | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0026 – 0.003 | 0.0015 | MDL | 0.0000059 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0015 – 0.0017 | 0.00085 | MDL | 0.000032 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0068 – 0.0079 | 0.00395 | MDL | 0.02 | | NRWQC | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.094 – 0.11 | 0.055 | MDL | 0.0007 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.094 – 0.11 | 0.055 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.47 – 0.55 | 0.275 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.39 – 0.45 | 0.225 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.19 | 0.095 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.15 – 0.18 | 0.09 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.11 – 0.13 | 0.065 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.12 – 0.14 | 0.07 | MDL | 0.5 | | EPA_MCL_2018 | No | 100% ND and 1/2 MDL ≤ SL |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 10 – 10 | 5 | MDL | 4 | | NRWQC | See DSA | 100% ND and 1/2 MDL > SL |
| Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 106 | B | 1060 | | µg/L | SW-02 (12/19/2007) | N/A | 7/7 | 100% | N/A | 1060 | MDC | 20000 | | RSLx10 | No | MDC ≤ SL (1/2 MDL N/A) |
| Antimony | 7440-36-0 | 6.2 | | 6.2 | | µg/L | SW-03 (5/1/2007) | N/A | 1/7 | 14% | 5 – 11 | 6.2 | MDC | 5.6 | | VAWQS HH | Yes | MDC > SL |
| Arsenic | 7440-38-2 | 7 | | 11.7 | | µg/L | SW-04 (5/1/2007) | N/A | 7/7 | 100% | N/A | 11.7 | MDC | 0.018 | | NRWQC | Yes | MDC > SL (1/2 MDL N/A) |
| Barium | 7440-39-3 | 14.4 | B | 27.6 | B | µg/L | SW-02 (5/1/2007) | N/A | 7/7 | 100% | N/A | 27.6 | MDC | 1000 | | NRWQC | No | MDC ≤ SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 0.4 | U | 0.52 | B | µg/L | SW-03 (5/1/2007) | N/A | 3/7 | 43% | 0.15 – 0.4 | 0.52 | MDC | 4 | | EPA_MCL_2018 | No | 1/2 MDL and MDC ≤ SL |
| Cadmium | 7440-43-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 1.3 | 0.65 | MDL | 5 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |
| Calcium | 7440-70-2 | 230000 | | 266000 | | µg/L | SW-03 (12/19/2007) | N/A | 7/7 | 100% | N/A | 266000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 0.86 | B | 2 | B | µg/L | SW-03 (5/1/2007) | N/A | 3/7 | 43% | 0.8 – 9 | 2 | MDC | 100 | * | VAWQS HH | No | 1/2 MDL and MDC ≤ SL |
| Cobalt | 7440-48-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.87 – 1.8 | 0.9 | MDL | 6 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Copper | 7440-50-8 | 3.3 | B | 4.9 | B | µg/L | SW-02 (12/19/2007) | N/A | 3/7 | 43% | 2.7 – 2.7 | 4.9 | MDC | 1300 | | VAWQS HH | No | 1/2 MDL and MDC ≤ SL |
| Iron | 7439-89-6 | 228 | | 1030 | | µg/L | SW-02 (12/19/2007) | N/A | 7/7 | 100% | N/A | 1030 | MDC | 300 | | VAWQS HH | Yes | MDC > SL (1/2 MDL N/A) |

Table 2-10
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Downgradient Estuarine; Surface Water)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Screening Level (2, 3) | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 7439-92-1 | 3.1 | B | 4 | B | µg/L | SW-04 (12/19/2007) | N/A | 2/7 | 29% | 2.8 – 3 | 4 | MDC | 15 | | VAWQS HH | No | 1/2 MDL and MDC ≤ SL |
| Magnesium | 7439-95-4 | 721000 | | 1060000 | | µg/L | SW-03 (12/19/2007) | N/A | 7/7 | 100% | N/A | 1060000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 20.9 | | 43.5 | | µg/L | SW-03 (5/1/2007) | N/A | 7/7 | 100% | N/A | 43.5 | MDC | 50 | | NRWQC | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | 0.066 | B | 0.091 | B | µg/L | Multiple Locations | N/A | 3/7 | 43% | 0.037 – 0.15 | 0.091 | MDC | 2 | | EPA_MCL_2018 | No | 1/2 MDL and MDC ≤ SL |
| Nickel | 7440-02-0 | 2.9 | B | 2.9 | B | µg/L | SW-03 (5/1/2007) | N/A | 1/7 | 14% | 2.8 – 4.2 | 2.9 | MDC | 610 | | VAWQS HH | No | 1/2 MDL and MDC ≤ SL |
| Potassium | 7440-09-7 | 330000 | | 457000 | | µg/L | SW-04 (5/1/2007) | N/A | 7/7 | 100% | N/A | 457000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 6.6 | B | 11.8 | | µg/L | SW-04 (12/19/2007) | N/A | 7/7 | 100% | N/A | 11.8 | MDC | 170 | | VAWQS HH | No | MDC ≤ SL (1/2 MDL N/A) |
| Silver | 7440-22-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 2.6 | 1.3 | MDL | 94 | | RSLx10 | No | 100% ND and 1/2 MDL ≤ SL |
| Sodium | 7440-23-5 | 7010000 | J | 9190000 | | µg/L | SW-03 (12/19/2007) | N/A | 7/7 | 100% | N/A | 9190000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.48 – 2.4 | 1.2 | MDL | 0.24 | | VAWQS HH | See DSA | 100% ND and 1/2 MDL > SL |
| Vanadium | 7440-62-2 | 2.7 | B | 4.4 | B | µg/L | SW-02 (12/19/2007) | N/A | 3/7 | 43% | 1.8 – 1.8 | 4.4 | MDC | 86 | | RSLx10 | No | 1/2 MDL and MDC ≤ SL |
| Zinc | 7440-66-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 2.9 – 3.4 | 1.7 | MDL | 7400 | | VAWQS HH | No | 100% ND and 1/2 MDL ≤ SL |

Notes:
% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
N/A = Not Applicable
ND = Non-Detect or Not Detected
NRWQC = National Recommended Water Quality Criteria
RSL = Regional Screening Level
SL = Screening Level
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA's NRWQC (Organism + Water) ; if unavailable, 10 x USEPA Tap Water RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-11
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.28 – 80 | 40 | MDL | 800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.28 – 80 | 40 | MDL | 0.076 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.32 – 80 | 40 | MDL | 0.041 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.69 – 80 | 40 | MDL | 1000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 2.8 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.28 – 80 | 40 | MDL | 28 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.16 – 80 | 40 | MDL | 0.4 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.8 – 80 | 40 | MDL | 0.00033 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.45 – 80 | 40 | MDL | 0.0075 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 30 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dichloroethane | 107-06-2 | 0.2 | J | 17.6 | | µg/L | MW-05 (12/18/2007) | 23 – 33 | 4/50 | 8% | 0.29 – 80 | 17.6 | MDC | 0.17 | | RSL | Yes | MDC > MCL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 0.82 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.21 – 80 | 40 | MDL | 30 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.17 – 80 | 40 | MDL | 0.48 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 2.6 – 400 | 200 | MDL | 560 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.94 – 400 | 200 | MDL | 3.8 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | 3.6 | J | 3.6 | J | µg/L | MW-04 (5/13/2016) | 4 – 14 | 1/50 | 2% | 1.1 – 400 | 3.6 | MDC | 630 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Acetone | 67-64-1 | 2.4 | U | 9 | J | µg/L | DPW11 (7/27/2015) | 10 – 15 | 4/50 | 8% | 2.4 – 400 | 9 | MDC | 1400 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | 0.77 | J | 2100 | | µg/L | DPW2 (7/22/2015) | 10 – 15 | 7/50 | 14% | 0.19 – 40 | 2100 | MDC | 0.46 | | RSL | Yes | MDC > MCL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.15 – 80 | 40 | MDL | 0.13 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Bromoform | 75-25-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.34 – 80 | 40 | MDL | 3.3 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.22 – 80 | 40 | MDL | 0.75 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Carbon disulfide | 75-15-0 | 0.44 | J | 0.44 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/50 | 2% | 0.14 – 80 | 0.44 | MDC | 81 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.19 – 80 | 40 | MDL | 0.46 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.19 – 80 | 40 | MDL | 7.8 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Chloroethane | 75-00-3 | 4.4 | J | 4.4 | J | µg/L | MW-04 (5/13/2016) | 4 – 14 | 1/50 | 2% | 0.56 – 80 | 4.4 | MDC | 2100 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Chloroform | 67-66-3 | 0.72 | J | 0.72 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/50 | 2% | 0.22 – 80 | 0.72 | MDC | 0.22 | | RSL | Yes | MDC > SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.3 – 80 | 40 | MDL | 19 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| cis-1,2-Dichloroethene | 156-59-2 | 0.37 | J | 54.5 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 8/50 | 16% | 0.18 – 80 | 54.5 | MDC | 3.6 | | RSL | Yes | MDC > SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.13 – 80 | 40 | MDL | 0.47 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Cyclohexane | 110-82-7 | 128 | | 490 | | µg/L | DPW14 (5/5/2016) | 10 – 15 | 13/50 | 26% | 0.5 – 16 | 490 | MDC | 1300 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.19 – 80 | 40 | MDL | 0.87 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.75 – 80 | 40 | MDL | 20 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Ethylbenzene | 100-41-4 | 2.9 | | 1300 | | µg/L | Multiple Locations | N/A | 15/50 | 30% | 0.2 – 16 | 1300 | MDC | 1.5 | | RSL | Yes | MDC > MCL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.13 – 4 | 2 | MDL | 0.14 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Isopropylbenzene | 98-82-8 | 0.47 | J | 91 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 16/50 | 32% | 0.2 – 0.8 | 91 | MDC | 45 | | RSL | Yes | MDC > SL |
| m,p-Xylene | 179601-23-1 | 1490 | | 2180 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 3/12 | 25% | 0.35 – 0.42 | 2180 | MDC | 19 | * | RSL | Yes | MDC > SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.8 – 80 | 40 | MDL | 2000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 14 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |

Table 2-11
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | 1.8 | J | 440 | | µg/L | DPW14 (5/5/2016) | 10 – 15 | 17/50 | 34% | 0.18 – 0.8 | 440 | MDC | 1300 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.21 – 80 | 40 | MDL | 11 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Naphthalene | 91-20-3 | 0.063 | J | 120 | | µg/L | Multiple Locations | N/A | 22/51 | 43% | 0.16 – 0.35 | 120 | MDC | 0.12 | | RSL | Yes | MDC > SL |
| o-Xylene | 95-47-6 | 416 | | 859 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 3/12 | 25% | 0.2 – 0.31 | 859 | MDC | 19 | | RSL | Yes | MDC > SL |
| Styrene | 100-42-5 | 9.5 | J | 21 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/50 | 4% | 0.16 – 40 | 21 | MDC | 120 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Tetrachloroethene | 127-18-4 | 3.6 | J | 14 | J | µg/L | Multiple Locations | N/A | 7/50 | 14% | 0.28 – 80 | 14 | MDC | 4.1 | | RSL | Yes | MDC > MCL |
| Toluene | 108-88-3 | 6.5 | | 9800 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 16/50 | 32% | 0.2 – 16 | 9800 | MDC | 110 | | RSL | Yes | MDC > MCL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.32 – 80 | 40 | MDL | 6.8 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.17 – 80 | 40 | MDL | 0.47 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Trichloroethene | 79-01-6 | 3.1 | J | 3.6 | J | µg/L | MW-04 (5/2/2007) | 4 – 14 | 2/50 | 4% | 0.26 – 80 | 3.6 | MDC | 0.28 | | RSL | Yes | MDC > SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.25 – 80 | 40 | MDL | 520 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.22 – 80 | 40 | MDL | 0.019 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Xylene (total) | 1330-20-7 | 14 | | 4800 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 16/50 | 32% | 0.2 – 0.8 | 4800 | MDC | 19 | | RSL | Yes | MDC > SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1.1 | | 5.5 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 14/51 | 27% | 0.22 – 0.44 | 5.5 | MDC | 0.083 | | RSL | Yes | MDC > SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 120 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 1.2 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 4.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | 1.9 | J | 1.9 | J | µg/L | MW-04 (11/15/2016) | 4 – 14 | 1/51 | 2% | 0.8 – 8 | 1.9 | MDC | 36 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.89 – 32 | 16 | MDL | 3.9 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.54 – 10 | 5 | MDL | 0.24 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.5 – 10 | 5 | MDL | 0.049 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.2 – 4 | 2 | MDL | 75 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 9.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | 0.065 | J | 71 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 19/51 | 37% | 0.1 – 0.76 | 71 | MDC | 3.6 | | RSL | Yes | MDC > SL |
| 2-Methylphenol | 95-48-7 | 0.63 | J | 7.3 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.4 – 4 | 7.3 | MDC | 93 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.5 – 16 | 8 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.8 – 8 | 4 | MDL | 3.9 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 3&4-Methylphenol | 15831-10-4 | 0.51 | J | 25 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 8/51 | 16% | 1.1 – 20 | 25 | MDC | 93 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/48 | 0% | 0.97 – 20 | 10 | MDL | 0.13 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.32 – 16 | 8 | MDL | 19 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.72 – 40 | 20 | MDL | 0.15 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.3 – 4 | 2 | MDL | 4 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.8 – 8 | 4 | MDL | 140 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.35 – 4 | 2 | MDL | 0.37 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.29 – 4 | 2 | MDL | 4 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.59 – 16 | 8 | MDL | 3.8 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.84 – 20 | 10 | MDL | 3.9 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Acenaphthene | 83-32-9 | 0.092 | J | 3.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 9/51 | 18% | 0.16 – 1.6 | 3.6 | MDC | 53 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 1.6 | 0.8 | MDL | 53 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

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Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.36 – 8 | 4 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | 0.069 | J | 1.6 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 4/51 | 8% | 0.16 – 1.6 | 1.6 | MDC | 180 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Atrazine | 1912-24-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 4 | 2 | MDL | 0.3 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/39 | 0% | 2 – 20 | 10 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | 0.13 | J | 0.55 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.16 – 1.6 | 0.55 | MDC | 0.03 | | RSL | Yes | MDC > SL |
| Benzo(a)pyrene | 50-32-8 | 0.088 | J | 0.34 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 1.6 | 0.34 | MDC | 0.025 | | RSL | Yes | MDC > MCL |
| Benzo(b)fluoranthene | 205-99-2 | 0.11 | J | 0.32 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.16 – 1.6 | 0.32 | MDC | 0.25 | | RSL | Yes | MDC > SL |
| Benzo(g,h,i)perylene | 191-24-2 | 0.047 | J | 0.14 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 1.6 | 0.14 | MDC | 12 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | 0.17 | J | 0.17 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 1/51 | 2% | 0.16 – 1.6 | 0.17 | MDC | 2.5 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.32 – 4 | 2 | MDL | 5.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 0.014 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 71 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.44 | J | 2.5 | B | µg/L | MW-06 (5/2/2007) | 11 – 21 | 5/51 | 10% | 0.66 – 40 | 2.5 | MDC | 5.6 | | RSL | See DSA | MDC ≤ SL < 1/2 MDL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.59 – 40 | 20 | MDL | 16 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Caprolactam | 105-60-2 | 1.3 | J | 1.3 | J | µg/L | DPW5 (7/24/2015) | 13 – 18 | 1/51 | 2% | 0.32 – 40 | 1.3 | MDC | 990 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Carbazole | 86-74-8 | 0.6 | J | 9.1 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.36 – 8 | 9.1 | MDC | 29 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Chrysene | 218-01-9 | 0.068 | J | 0.33 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 1.6 | 0.33 | MDC | 25 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 1.6 | 0.8 | MDL | 0.025 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Dibenzofuran | 132-64-9 | 0.19 | J | 3.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 7/51 | 14% | 0.23 – 4 | 3.6 | MDC | 0.79 | | RSL | Yes | MDC > SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.34 – 40 | 20 | MDL | 1500 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.33 – 40 | 20 | MDL | 1500 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 40 | 20 | MDL | 90 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.48 – 40 | 20 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | 0.1 | J | 2 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 5/51 | 10% | 0.16 – 1.6 | 2 | MDC | 80 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Fluorene | 86-73-7 | 0.23 | J | 3.9 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 10/51 | 20% | 0.16 – 1.6 | 3.9 | MDC | 29 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.31 – 8 | 4 | MDL | 0.0098 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.1 – 32 | 16 | MDL | 0.041 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 4 | 2 | MDL | 0.33 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.13 | J | 0.13 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 1/51 | 2% | 0.16 – 1.6 | 0.13 | MDC | 0.25 | | RSL | See DSA | MDC ≤ SL < 1/2 MDL |
| Isophorone | 78-59-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.49 – 8 | 4 | MDL | 78 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 0.14 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.38 – 8 | 4 | MDL | 0.011 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.41 – 9.2 | 4.6 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.93 – 15 | 7.5 | MDL | 0.041 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Phenanthrene | 85-01-8 | 0.075 | J | 6.8 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 11/51 | 22% | 0.16 – 1.6 | 6.8 | MDC | 180 | * | RSL | No | 1/2 MDL and MDC ≤ SL |
| Phenol | 108-95-2 | 3.6 | | 19 | | µg/L | DPW2 (7/22/2015) | 10 – 15 | 3/51 | 6% | 0.4 – 4 | 19 | MDC | 580 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Pyrene | 129-00-0 | 0.085 | J | 1.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 7/51 | 14% | 0.16 – 1.6 | 1.6 | MDC | 12 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0024 – 0.0027 | 0.00135 | MDL | 0.0063 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 0.046 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-11
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0049 – 0.0055 | 0.00275 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aldrin | 309-00-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0033 – 0.0037 | 0.00185 | MDL | 0.00092 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0026 – 0.0029 | 0.00145 | MDL | 0.0072 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0044 – 0.0048 | 0.0024 | MDL | 0.02 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0062 – 0.0069 | 0.00345 | MDL | 0.025 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| delta-BHC | 319-86-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0031 – 0.0034 | 0.0017 | MDL | 0.025 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dieldrin | 60-57-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 0.0018 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0046 – 0.0051 | 0.00255 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0021 – 0.0023 | 0.00115 | MDL | 10 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0032 – 0.0036 | 0.0018 | MDL | 10 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin | 72-20-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.003 – 0.0033 | 0.00165 | MDL | 0.23 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0064 – 0.0072 | 0.0036 | MDL | 0.23 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0035 – 0.0039 | 0.00195 | MDL | 0.23 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 0.042 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 0.02 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0026 – 0.0028 | 0.0014 | MDL | 0.0014 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0015 – 0.0016 | 0.0008 | MDL | 0.0014 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0068 – 0.0075 | 0.00375 | MDL | 3.7 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toxaphene | 8001-35-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.094 – 0.1 | 0.05 | MDL | 0.071 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.094 – 0.1 | 0.05 | MDL | 0.14 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.47 – 0.52 | 0.26 | MDL | 0.0047 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.39 – 0.43 | 0.215 | MDL | 0.0047 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.16 – 0.18 | 0.09 | MDL | 0.0078 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.15 – 0.17 | 0.085 | MDL | 0.0078 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.11 – 0.12 | 0.06 | MDL | 0.0078 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.12 – 0.13 | 0.065 | MDL | 0.0078 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Dioxins and Furans | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.0000714 | | 0.0000714 | | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 3.41E-11 – 3.80E-11 | 0.0000714 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.0000412 | J | 0.0000412 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 3.41E-11 – 3.80E-11 | 0.0000412 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |

Table 2-11
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,4,7,8-PECDF | 57117-31-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 6.80E-12 – 7.57E-12 | 3.785E-12 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.000004 | J | 0.000004 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 6.80E-12 – 7.57E-12 | 0.000004 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDD | 3268-87-9 | 0.0000374 | J | 0.00147 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 19/22 | 86% | 7.48E-11 – 7.57E-11 | 0.00147 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDF | 39001-02-0 | 0.0000586 | J | 0.0000586 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 6.80E-11 – 7.57E-11 | 0.0000586 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0000195 | | 0.0000224 | | µg/L | DTW2 (8/26/2016) | 52 – 57 | 22/22 | 100% | N/A | 0.0000224 | MDC | 0.00000012 | * | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 10 – 10 | 5 | MDL | 0.15 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 38.6 | B | 55000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 18/51 | 35% | 23 – 200 | 55000 | MDC | 2000 | | RSL | Yes | MDC > SL |
| Antimony | 7440-36-0 | 1 | B | 1 | B | µg/L | MW-05 (12/18/2007) | 23 – 33 | 1/51 | 2% | 0.9 – 15 | 1 | MDC | 0.78 | | RSL | Yes | MDC > SL |
| Arsenic | 7440-38-2 | 1.7 | B | 71 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 20/51 | 39% | 0.94 – 8 | 71 | MDC | 0.052 | | RSL | Yes | MDC > MCL |
| Barium | 7440-39-3 | 3.3 | B | 890 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 890 | MDC | 380 | | RSL | Yes | MDC > SL (1/2 MDL N/A) |
| Beryllium | 7440-41-7 | 5.6 | | 5.6 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 1/51 | 2% | 0.15 – 10 | 5.6 | MDC | 2.5 | | RSL | Yes | MDC > MCL |
| Cadmium | 7440-43-9 | 0.3 | B | 5 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 5/51 | 10% | 0.24 – 10 | 5 | MDC | 0.92 | | RSL | Yes | MDC > SL |
| Calcium | 7440-70-2 | 12000 | B | 150000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 150000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | 0.78 | J | 33 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 19/51 | 37% | 0.53 – 10 | 33 | MDC | 0.035 | * | RSL | Yes | MDC > SL |
| Cobalt | 7440-48-4 | 1.3 | J | 42 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 13/51 | 25% | 0.15 – 13 | 42 | MDC | 0.6 | | RSL | Yes | MDC > SL |
| Copper | 7440-50-8 | 1.9 | J | 51 | | µg/L | MW-03 (11/15/2016) | 3 – 13 | 11/51 | 22% | 2.7 – 10 | 51 | MDC | 80 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Iron | 7439-89-6 | 19.8 | B | 100000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 41/51 | 80% | 25 – 80 | 100000 | MDC | 1400 | | RSL | Yes | MDC > SL |
| Lead | 7439-92-1 | 1.6 | B | 140 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 18/51 | 35% | 2.8 – 10 | 140 | MDC | 15 | | RSL | Yes | MDC > MCL |
| Magnesium | 7439-95-4 | 850 | J | 19000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 49/51 | 96% | 2500 – 2500 | 19000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 1.7 | B | 4000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 49/51 | 96% | 1.5 – 1.5 | 4000 | MDC | 43 | | RSL | Yes | MDC > SL |
| Mercury | 7439-97-6 | 0.029 | J | 0.3 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 11/51 | 22% | 0.1 – 10 | 0.3 | MDC | 0.063 | | RSL | Yes | MDC > SL |
| Nickel | 7440-02-0 | 0.8 | B | 21 | J | µg/L | DTW1 (8/19/2016) | 59 – 64 | 14/51 | 27% | 0.73 – 10 | 21 | MDC | 39 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Potassium | 7440-09-7 | 410 | J | 9800 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 9800 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | 2 | B | 4.8 | B | µg/L | MW-05 (12/18/2007) | 23 – 33 | 6/51 | 12% | 6.2 – 17 | 4.8 | MDC | 10 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Silver | 7440-22-4 | 1.1 | B | 1.1 | B | µg/L | MW-06 (5/2/2007) | 11 – 21 | 1/51 | 2% | 1 – 10 | 1.1 | MDC | 9.4 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Sodium | 7440-23-5 | 3800 | J | 39000 | | µg/L | MW-05 (5/13/2016) | 23 – 33 | 51/51 | 100% | N/A | 39000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | 1.3 | | 1.3 | | µg/L | MW-06 (12/18/2007) | 11 – 21 | 1/51 | 2% | 0.48 – 25 | 1.3 | MDC | 0.02 | | RSL | Yes | MDC > SL |
| Vanadium | 7440-62-2 | 0.9 | B | 59 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 13/51 | 25% | 0.49 – 25 | 59 | MDC | 8.6 | | RSL | Yes | MDC > SL |
| Zinc | 7440-66-6 | 2.3 | J | 2900 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 30/51 | 59% | 2.7 – 10 | 2900 | MDC | 600 | | RSL | Yes | MDC > SL |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration

Table 2-11
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits (1) | Screening Concentration | Screening Level (2, 3) | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Tap Water RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-12
Occurrence, Distribution, and Selection of Constituents of Interest (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.28 – 80 | 40 | MDL | 742 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.28 – 80 | 40 | MDL | 3.23 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.32 – 80 | 40 | MDL | 0.619 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.69 – 80 | 40 | MDL | 24.2 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 7.64 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.28 – 80 | 40 | MDL | 19.5 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.16 – 80 | 40 | MDL | 3.59 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.8 – 80 | 40 | MDL | 0.0281 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.45 – 80 | 40 | MDL | 0.176 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 266 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | 0.2 | J | 17.6 | | µg/L | MW-05 (12/18/2007) | 23 – 33 | 4/50 | 8% | 0.29 – 80 | 17.6 | MDC | 2.24 | | VISL | Yes | MDC > SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 3.62 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.21 – 80 | 40 | MDL | 266 | * | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.17 – 80 | 40 | MDL | 2.59 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 2.6 – 400 | 200 | MDL | 224000 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.94 – 400 | 200 | MDL | 821 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | 3.6 | J | 3.6 | J | µg/L | MW-04 (5/13/2016) | 4 – 14 | 1/50 | 2% | 1.1 – 400 | 3.6 | MDC | 55500 | | VISL | No | 1/2 MDL and MDC ≤ SL |
| Acetone | 67-64-1 | 2.4 | U | 9 | J | µg/L | DPW11 (7/27/2015) | 10 – 15 | 4/50 | 8% | 2.4 – 400 | 9 | MDC | 2250000 | | VISL | No | 1/2 MDL and MDC ≤ SL |
| Benzene | 71-43-2 | 0.77 | J | 2100 | | µg/L | DPW2 (7/22/2015) | 10 – 15 | 7/50 | 14% | 0.19 – 40 | 2100 | MDC | 1.59 | | VISL | Yes | MDC > SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.15 – 80 | 40 | MDL | 0.876 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Bromoform | 75-25-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.34 – 80 | 40 | MDL | 117 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.22 – 80 | 40 | MDL | 1.74 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Carbon disulfide | 75-15-0 | 0.44 | J | 0.44 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/50 | 2% | 0.14 – 80 | 0.44 | MDC | 124 | | VISL | No | 1/2 MDL and MDC ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.19 – 80 | 40 | MDL | 0.415 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.19 – 80 | 40 | MDL | 41 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | 4.4 | J | 4.4 | J | µg/L | MW-04 (5/13/2016) | 4 – 14 | 1/50 | 2% | 0.56 – 80 | 4.4 | MDC | 2300 | | VISL | No | 1/2 MDL and MDC ≤ SL |
| Chloroform | 67-66-3 | 0.72 | J | 0.72 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/50 | 2% | 0.22 – 80 | 0.72 | MDC | 0.814 | | VISL | See DSA | MDC ≤ SL < 1/2 MDL |
| Chloromethane | 74-87-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.3 – 80 | 40 | MDL | 26 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| cis-1,2-Dichloroethene | 156-59-2 | 0.37 | J | 54.5 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 8/50 | 16% | 0.18 – 80 | 54.5 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.13 – 80 | 40 | MDL | 4.84 | * | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Cyclohexane | 110-82-7 | 128 | | 490 | | µg/L | DPW14 (5/5/2016) | 10 – 15 | 13/50 | 26% | 0.5 – 16 | 490 | MDC | 102 | | VISL | Yes | MDC > SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.19 – 80 | 40 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.75 – 80 | 40 | MDL | 0.744 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Ethylbenzene | 100-41-4 | 2.9 | | 1300 | | µg/L | Multiple Locations | N/A | 15/50 | 30% | 0.2 – 16 | 1300 | MDC | 3.49 | | VISL | Yes | MDC > SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.13 – 4 | 2 | MDL | 0.303 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Isopropylbenzene | 98-82-8 | 0.47 | J | 91 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 16/50 | 32% | 0.2 – 0.8 | 91 | MDC | 88.7 | | VISL | Yes | MDC > SL |
| m,p-Xylene | 179601-23-1 | 1490 | | 2180 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 3/12 | 25% | 0.35 – 0.42 | 2180 | MDC | 35.5 | * | VISL | Yes | MDC > SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.8 – 80 | 40 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.2 – 80 | 40 | MDL | 450 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-12
Occurrence, Distribution, and Selection of Constituents of Interest (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylcyclohexane | 108-87-2 | 1.8 | J | 440 | | µg/L | DPW14 (5/5/2016) | 10 – 15 | 17/50 | 34% | 0.18 – 0.8 | 440 | MDC | 102 | * | VISL | Yes | MDC > SL |
| Methylene chloride | 75-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.21 – 80 | 40 | MDL | 471 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | 0.063 | J | 120 | | µg/L | Multiple Locations | N/A | 22/51 | 43% | 0.16 – 0.35 | 120 | MDC | 4.59 | | VISL | Yes | MDC > SL |
| o-Xylene | 95-47-6 | 416 | | 859 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 3/12 | 25% | 0.2 – 0.31 | 859 | MDC | 49.2 | | VISL | Yes | MDC > SL |
| Styrene | 100-42-5 | 9.5 | J | 21 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/50 | 4% | 0.16 – 40 | 21 | MDC | 928 | | VISL | No | 1/2 MDL and MDC ≤ SL |
| Tetrachloroethene | 127-18-4 | 3.6 | J | 14 | J | µg/L | Multiple Locations | N/A | 7/50 | 14% | 0.28 – 80 | 14 | MDC | 5.76 | | VISL | Yes | MDC > SL |
| Toluene | 108-88-3 | 6.5 | | 9800 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 16/50 | 32% | 0.2 – 16 | 9800 | MDC | 1920 | | VISL | Yes | MDC > SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.32 – 80 | 40 | MDL | 10.9 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.17 – 80 | 40 | MDL | 4.84 | * | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Trichloroethene | 79-01-6 | 3.1 | J | 3.6 | J | µg/L | MW-04 (5/2/2007) | 4 – 14 | 2/50 | 4% | 0.26 – 80 | 3.6 | MDC | 0.518 | | VISL | Yes | MDC > SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.25 – 80 | 40 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.22 – 80 | 40 | MDL | 0.147 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Xylene (total) | 1330-20-7 | 14 | | 4800 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 16/50 | 32% | 0.2 – 0.8 | 4800 | MDC | 38.5 | | VISL | Yes | MDC > SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1.1 | | 5.5 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 14/51 | 27% | 0.22 – 0.44 | 5.5 | MDC | 3.31 | | VISL | Yes | MDC > SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2,4-Dimethylphenol | 105-67-9 | 1.9 | J | 1.9 | J | µg/L | MW-04 (11/15/2016) | 4 – 14 | 1/51 | 2% | 0.8 – 8 | 1.9 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.89 – 32 | 16 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.54 – 10 | 5 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.5 – 10 | 5 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.2 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2-Methylnaphthalene | 91-57-6 | 0.065 | J | 71 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 19/51 | 37% | 0.1 – 0.76 | 71 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| 2-Methylphenol | 95-48-7 | 0.63 | J | 7.3 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.4 – 4 | 7.3 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.5 – 16 | 8 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.8 – 8 | 4 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| 3&4-Methylphenol | 15831-10-4 | 0.51 | J | 25 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 8/51 | 16% | 1.1 – 20 | 25 | MDC | - | * | N/A | No | No SL or surrogate toxicity available |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/48 | 0% | 0.97 – 20 | 10 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.32 – 16 | 8 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.72 – 40 | 20 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.3 – 4 | 2 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.8 – 8 | 4 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.35 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.29 – 4 | 2 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.59 – 16 | 8 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.84 – 20 | 10 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| Acenaphthene | 83-32-9 | 0.092 | J | 3.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 9/51 | 18% | 0.16 – 1.6 | 3.6 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 1.6 | 0.8 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |

Table 2-12
Occurrence, Distribution, and Selection of Constituents of Interest (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetophenone | 98-86-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.36 – 8 | 4 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Anthracene | 120-12-7 | 0.069 | J | 1.6 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 4/51 | 8% | 0.16 – 1.6 | 1.6 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Atrazine | 1912-24-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/39 | 0% | 2 – 20 | 10 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Benzo(a)anthracene | 56-55-3 | 0.13 | J | 0.55 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.16 – 1.6 | 0.55 | MDC | 34.4 | | VISL | No | 1/2 MDL and MDC ≤ SL |
| Benzo(a)pyrene | 50-32-8 | 0.088 | J | 0.34 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 1.6 | 0.34 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Benzo(b)fluoranthene | 205-99-2 | 0.11 | J | 0.32 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.16 – 1.6 | 0.32 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Benzo(g,h,i)perylene | 191-24-2 | 0.047 | J | 0.14 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 1.6 | 0.14 | MDC | - | * | N/A | No | No SL or surrogate toxicity available |
| Benzo(k)fluoranthene | 207-08-9 | 0.17 | J | 0.17 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 1/51 | 2% | 0.16 – 1.6 | 0.17 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.32 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 12.2 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.44 | J | 2.5 | B | µg/L | MW-06 (5/2/2007) | 11 – 21 | 5/51 | 10% | 0.66 – 40 | 2.5 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.59 – 40 | 20 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Caprolactam | 105-60-2 | 1.3 | J | 1.3 | J | µg/L | DPW5 (7/24/2015) | 13 – 18 | 1/51 | 2% | 0.32 – 40 | 1.3 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Carbazole | 86-74-8 | 0.6 | J | 9.1 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.36 – 8 | 9.1 | MDC | - | * | N/A | No | No SL or surrogate toxicity available |
| Chrysene | 218-01-9 | 0.068 | J | 0.33 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 1.6 | 0.33 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 1.6 | 0.8 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Dibenzofuran | 132-64-9 | 0.19 | J | 3.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 7/51 | 14% | 0.23 – 4 | 3.6 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.34 – 40 | 20 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.33 – 40 | 20 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 40 | 20 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.48 – 40 | 20 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Fluoranthene | 206-44-0 | 0.1 | J | 2 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 5/51 | 10% | 0.16 – 1.6 | 2 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Fluorene | 86-73-7 | 0.23 | J | 3.9 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 10/51 | 20% | 0.16 – 1.6 | 3.9 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.31 – 8 | 4 | MDL | 0.0878 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.1 – 32 | 16 | MDL | 0.0189 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.16 – 4 | 2 | MDL | 1.6 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.13 | J | 0.13 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 1/51 | 2% | 0.16 – 1.6 | 0.13 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Isophorone | 78-59-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.49 – 8 | 4 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.4 – 4 | 2 | MDL | 71.5 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.38 – 8 | 4 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/50 | 0% | 0.41 – 9.2 | 4.6 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/51 | 0% | 0.93 – 15 | 7.5 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Phenanthrene | 85-01-8 | 0.075 | J | 6.8 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 11/51 | 22% | 0.16 – 1.6 | 6.8 | MDC | - | * | N/A | No | No SL or surrogate toxicity available |
| Phenol | 108-95-2 | 3.6 | | 19 | | µg/L | DPW2 (7/22/2015) | 10 – 15 | 3/51 | 6% | 0.4 – 4 | 19 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Pyrene | 129-00-0 | 0.085 | J | 1.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 7/51 | 14% | 0.16 – 1.6 | 1.6 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Pesticides | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0024 – 0.0027 | 0.00135 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 17 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-12
Occurrence, Distribution, and Selection of Constituents of Interest (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0049 – 0.0055 | 0.00275 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Aldrin | 309-00-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0033 – 0.0037 | 0.00185 | MDL | 0.319 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| alpha-BHC | 319-84-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0026 – 0.0029 | 0.00145 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0044 – 0.0048 | 0.0024 | MDL | 14.1 | * | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| beta-BHC | 319-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0062 – 0.0069 | 0.00345 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| delta-BHC | 319-86-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0031 – 0.0034 | 0.0017 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| Dieldrin | 60-57-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0046 – 0.0051 | 0.00255 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0021 – 0.0023 | 0.00115 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0032 – 0.0036 | 0.0018 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| Endrin | 72-20-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.003 – 0.0033 | 0.00165 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0064 – 0.0072 | 0.0036 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0035 – 0.0039 | 0.00195 | MDL | - | * | N/A | No | No SL or surrogate toxicity available |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0017 – 0.0019 | 0.00095 | MDL | 14.1 | * | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor | 76-44-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0026 – 0.0028 | 0.0014 | MDL | 0.18 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0015 – 0.0016 | 0.0008 | MDL | 1.26 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Methoxychlor | 72-43-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.0068 – 0.0075 | 0.00375 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Toxaphene | 8001-35-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.094 – 0.1 | 0.05 | MDL | - | | N/A | No | No SL or surrogate toxicity available |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.094 – 0.1 | 0.05 | MDL | 17.2 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.47 – 0.52 | 0.26 | MDL | 0.527 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.39 – 0.43 | 0.215 | MDL | 0.163 | | VISL | See DSA | 100% ND and 1/2 MDL > SL |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.16 – 0.18 | 0.09 | MDL | 0.35 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.15 – 0.17 | 0.085 | MDL | 0.273 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.11 – 0.12 | 0.06 | MDL | 0.425 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 0.12 – 0.13 | 0.065 | MDL | 0.358 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Dioxins and Furans | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.0000714 | | 0.0000714 | | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 3.41E-11 – 3.80E-11 | 0.0000714 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.0000412 | J | 0.0000412 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 3.41E-11 – 3.80E-11 | 0.0000412 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |

Table 2-12
Occurrence, Distribution, and Selection of Constituents of Interest (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,4,7,8-PECDF | 57117-31-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 3.41E-11 – 3.80E-11 | 1.9E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/22 | 0% | 6.80E-12 – 7.57E-12 | 3.785E-12 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.000004 | J | 0.000004 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 6.80E-12 – 7.57E-12 | 0.000004 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDD | 3268-87-9 | 0.0000374 | J | 0.00147 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 19/22 | 86% | 7.48E-11 – 7.57E-11 | 0.00147 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDF | 39001-02-0 | 0.0000586 | J | 0.0000586 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/22 | 5% | 6.80E-11 – 7.57E-11 | 0.0000586 | MDC | See TEQ | | N/A | See TEQ | See TEQ summation below |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0000195 | | 0.0000224 | | µg/L | DTW2 (8/26/2016) | 52 – 57 | 22/22 | 100% | N/A | 0.0000224 | MDC | 0.0000361 | * | VISL | No | MDC ≤ SL (1/2 MDL N/A) |
| Total Cyanide | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/12 | 0% | 10 – 10 | 5 | MDL | 20.1 | | VISL | No | 100% ND and 1/2 MDL ≤ SL |
| Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 38.6 | B | 55000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 18/51 | 35% | 23 – 200 | 55000 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Antimony | 7440-36-0 | 1 | B | 1 | B | µg/L | MW-05 (12/18/2007) | 23 – 33 | 1/51 | 2% | 0.9 – 15 | 1 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Arsenic | 7440-38-2 | 1.7 | B | 71 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 20/51 | 39% | 0.94 – 8 | 71 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Barium | 7440-39-3 | 3.3 | B | 890 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 890 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Beryllium | 7440-41-7 | 5.6 | | 5.6 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 1/51 | 2% | 0.15 – 10 | 5.6 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Cadmium | 7440-43-9 | 0.3 | B | 5 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 5/51 | 10% | 0.24 – 10 | 5 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Calcium | 7440-70-2 | 12000 | B | 150000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 150000 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Chromium | 7440-47-3 | 0.78 | J | 33 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 19/51 | 37% | 0.53 – 10 | 33 | MDC | - | * | N/A | No | No SL or surrogate toxicity available |
| Cobalt | 7440-48-4 | 1.3 | J | 42 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 13/51 | 25% | 0.15 – 13 | 42 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Copper | 7440-50-8 | 1.9 | J | 51 | | µg/L | MW-03 (11/15/2016) | 3 – 13 | 11/51 | 22% | 2.7 – 10 | 51 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Iron | 7439-89-6 | 19.8 | B | 100000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 41/51 | 80% | 25 – 80 | 100000 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Lead | 7439-92-1 | 1.6 | B | 140 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 18/51 | 35% | 2.8 – 10 | 140 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Magnesium | 7439-95-4 | 850 | J | 19000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 49/51 | 96% | 2500 – 2500 | 19000 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Manganese | 7439-96-5 | 1.7 | B | 4000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 49/51 | 96% | 1.5 – 1.5 | 4000 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Mercury | 7439-97-6 | 0.029 | J | 0.3 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 11/51 | 22% | 0.1 – 10 | 0.3 | MDC | 0.0889 | | VISL | Yes | MDC > SL |
| Nickel | 7440-02-0 | 0.8 | B | 21 | J | µg/L | DTW1 (8/19/2016) | 59 – 64 | 14/51 | 27% | 0.73 – 10 | 21 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Potassium | 7440-09-7 | 410 | J | 9800 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 9800 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Selenium | 7782-49-2 | 2 | B | 4.8 | B | µg/L | MW-05 (12/18/2007) | 23 – 33 | 6/51 | 12% | 6.2 – 17 | 4.8 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Silver | 7440-22-4 | 1.1 | B | 1.1 | B | µg/L | MW-06 (5/2/2007) | 11 – 21 | 1/51 | 2% | 1 – 10 | 1.1 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Sodium | 7440-23-5 | 3800 | J | 39000 | | µg/L | MW-05 (5/13/2016) | 23 – 33 | 51/51 | 100% | N/A | 39000 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Thallium | 7440-28-0 | 1.3 | | 1.3 | | µg/L | MW-06 (12/18/2007) | 11 – 21 | 1/51 | 2% | 0.48 – 25 | 1.3 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Vanadium | 7440-62-2 | 0.9 | B | 59 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 13/51 | 25% | 0.49 – 25 | 59 | MDC | - | | N/A | No | No SL or surrogate toxicity available |
| Zinc | 7440-66-6 | 2.3 | J | 2900 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 30/51 | 59% | 2.7 – 10 | 2900 | MDC | - | | N/A | No | No SL or surrogate toxicity available |

Notes:

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration

Table 2-12
Occurrence, Distribution, and Selection of Constituents of Interest (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits [1] | Screening Concentration | Screening Level [2, 3] | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency
VISL = Vapor Intrusion Screening Level

(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Residential Groundwater VISLs, last updated May 2021 (TR = 1E-6, THQ = 0.1). Site-specific, system temperature was set to 16.1 Celsius (Virginia default; USEPA, 2004).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-13
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Yorktown Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Yorktown Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 800 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.076 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.041 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 1000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 2.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 28 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.00033 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.0075 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 30 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.17 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.82 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 30 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.48 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 4 – 4 | 2 | MDL | 560 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 4 – 4 | 2 | MDL | 3.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 4 – 4 | 2 | MDL | 630 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetone | 67-64-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 4 – 4 | 2 | MDL | 1400 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzene | 71-43-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.13 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Bromoform | 75-25-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 3.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Bromomethane | 74-83-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.75 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 81 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.46 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 7.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroethane | 75-00-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 2100 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chloroform | 67-66-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.22 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Chloromethane | 74-87-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cyclohexane | 110-82-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 1300 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.87 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 1.5 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.14 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 45 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Acetate | 79-20-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 2000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 14 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 1300 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-13
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Yorktown Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Yorktown Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methylene chloride | 75-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 11 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Naphthalene | 91-20-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 0.12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Styrene | 100-42-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 120 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 4.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Toluene | 108-88-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 110 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 6.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.47 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Trichloroethene | 79-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.28 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 520 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.019 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 0.8 – 0.8 | 0.4 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.083 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 120 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 1.2 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 4.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 36 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 3.2 – 3.2 | 1.6 | MDL | 3.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 1 – 1 | 0.5 | MDL | 0.24 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 1 – 1 | 0.5 | MDL | 0.049 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 75 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 9.1 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.1 – 0.1 | 0.05 | MDL | 3.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 93 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 1.6 – 1.6 | 0.8 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 3.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 2 – 2 | 1 | MDL | 93 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 2 – 2 | 1 | MDL | 0.13 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 1.6 – 1.6 | 0.8 | MDL | 19 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 0.15 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 4 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 140 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.37 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 4 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 1.6 – 1.6 | 0.8 | MDL | 3.8 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 2 – 2 | 1 | MDL | 3.9 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthene | 83-32-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 53 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 53 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Acetophenone | 98-86-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 190 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Anthracene | 120-12-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 180 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Table 2-13
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Yorktown Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Yorktown Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atrazine | 1912-24-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.3 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 2 – 2 | 1 | MDL | 19 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 0.03 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 0.025 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 0.25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 12 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 2.5 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 5.9 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.014 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 71 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 5.6 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 16 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Caprolactam | 105-60-2 | 0.92 | J | 1.2 | J | µg/L | TOC-06 (11/8/2017) | 154 – 225 | 2/3 | 67% | 4 – 4 | 1.2 | MDC | 990 | | RSL | No | 1/2 MDL and MDC ≤ SL |
| Carbazole | 86-74-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 29 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Chrysene | 218-01-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 0.025 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.79 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 1500 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 1500 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 90 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 4 – 4 | 2 | MDL | 20 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluoranthene | 206-44-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 80 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Fluorene | 86-73-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 29 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.0098 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 3.2 – 3.2 | 1.6 | MDL | 0.041 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.33 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 0.25 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Isophorone | 78-59-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 78 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 0.14 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| N-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.8 – 0.8 | 0.4 | MDL | 0.011 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| N-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.92 – 0.92 | 0.46 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 1.5 – 1.5 | 0.75 | MDL | 0.041 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Phenanthrene | 85-01-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 180 | * | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Phenol | 108-95-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.4 – 0.4 | 0.2 | MDL | 580 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Pyrene | 129-00-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.16 – 0.16 | 0.08 | MDL | 12 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Dioxins and Furans | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |

Table 2-13
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Yorktown Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Yorktown Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Screening Level [2, 3] | | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,4,7,8-PECDF | 57117-31-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 3.48E-11 – 3.51E-11 | 1.755E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 6.94E-12 – 6.99E-12 | 3.495E-12 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 6.94E-12 – 6.99E-12 | 3.495E-12 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDD | 3268-87-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 6.94E-11 – 6.99E-11 | 3.495E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| OCDF | 39001-02-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 6.94E-11 – 6.99E-11 | 3.495E-11 | MDL | See TEQ | | N/A | See TEQ | See TEQ summation below |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | N/A | | N/A | | µg/L | N/A | N/A | 0/2 | 0% | 1.98E-05 – 2.00E-05 | 0.00001 | MDL | 0.00000012 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Metals | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 200 – 200 | 100 | MDL | 2000 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Antimony | 7440-36-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 15 – 15 | 7.5 | MDL | 0.78 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Arsenic | 7440-38-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 8 – 8 | 4 | MDL | 0.052 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Barium | 7440-39-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 13 – 13 | 6.5 | MDL | 380 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Beryllium | 7440-41-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 2.5 – 2.5 | 1.25 | MDL | 2.5 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Cadmium | 7440-43-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 2.5 – 2.5 | 1.25 | MDL | 0.92 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Calcium | 7440-70-2 | 20000 | | 20000 | | µg/L | Multiple Locations | N/A | 3/3 | 100% | N/A | 20000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Chromium | 7440-47-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 5 – 5 | 2.5 | MDL | 0.035 | * | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Cobalt | 7440-48-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 13 – 13 | 6.5 | MDL | 0.6 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Copper | 7440-50-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 5 – 5 | 2.5 | MDL | 80 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Iron | 7439-89-6 | 390 | | 410 | | µg/L | Multiple Locations | N/A | 3/3 | 100% | N/A | 410 | MDC | 1400 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Lead | 7439-92-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 9 – 9 | 4.5 | MDL | 15 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Magnesium | 7439-95-4 | 18000 | | 18000 | | µg/L | Multiple Locations | N/A | 3/3 | 100% | N/A | 18000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Manganese | 7439-96-5 | 6.8 | J | 6.9 | J | µg/L | Multiple Locations | N/A | 3/3 | 100% | N/A | 6.9 | MDC | 43 | | RSL | No | MDC ≤ SL (1/2 MDL N/A) |
| Mercury | 7439-97-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 0.1 – 0.1 | 0.05 | MDL | 0.063 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Nickel | 7440-02-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 8 – 8 | 4 | MDL | 39 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Potassium | 7440-09-7 | 19000 | | 19000 | | µg/L | Multiple Locations | N/A | 3/3 | 100% | N/A | 19000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Selenium | 7782-49-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 17 – 17 | 8.5 | MDL | 10 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Silver | 7440-22-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 5 – 5 | 2.5 | MDL | 9.4 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |
| Sodium | 7440-23-5 | 43000 | | 43000 | | µg/L | Multiple Locations | N/A | 3/3 | 100% | N/A | 43000 | MDC | Nutrient | | N/A | No | Classified as an essential nutrient |
| Thallium | 7440-28-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 25 – 25 | 12.5 | MDL | 0.02 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Vanadium | 7440-62-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 25 – 25 | 12.5 | MDL | 8.6 | | RSL | See DSA | 100% ND and 1/2 MDL > SL |
| Zinc | 7440-66-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/3 | 0% | 10 – 10 | 5 | MDL | 600 | | RSL | No | 100% ND and 1/2 MDL ≤ SL |

Notes:
% = Percent

Table 2-13
Occurrence, Distribution, and Selection of Constituents of Interest (Direct Contact – Site-Wide; Groundwater, Yorktown Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Yorktown Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits (1) | Screening Concentration | Screening Level (2, 3) | Source | COPC Flag (Yes/No) | Rationale for Selection/Deletion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
DSA = Data Sensitivity Analysis
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
N/A = Not Applicable
ND = Non-Detect or Not Detected
RSL = Regional Screening Level
SL = Screening Level
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency
(1) Detection limits are the MDLs.
(2) Site data screened against USEPA Tap Water RSLs, last updated May 2021 (TR = 1E-6, THQ = 0.1).
(3) An asterisk,"*", indicates surrogate toxicity information was used to derive a Screening Level (see Table 2-14).

Table 2-14
Surrogate Toxicity Used within Human Health Risk Assessment
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Chemical | CASRN | Surrogate | CASRN |
|---|---|---|---|
| 1,3-Dichlorobenzene | 541-73-1 | 1,2-Dichlorobenzene | 95-50-1 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1,3-Dichloropropene | 542-75-6 |
| m,p-Xylene | 179601-23-1 | m-Xylene | 108-38-3 |
| Methylcyclohexane | 108-87-2 | Cyclohexane | 110-82-7 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1,3-Dichloropropene | 542-75-6 |
| 2-Nitrophenol | 88-75-5 | Dinitrophenol | 51-28-5 |
| 3&4-Methylphenol | 15831-10-4 | 3-Methylphenol | 108-39-4 |
| 3-Nitroaniline | 99-09-2 | 2-Nitroaniline | 88-74-4 |
| 4-Bromophenyl phenyl ether | 101-55-3 | Pentabromodiphenyl ether | 32534-81-9 |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | Pentabromodiphenyl ether | 32534-81-9 |
| 4-Nitrophenol | 100-02-7 | Dinitrophenol | 51-28-5 |
| Acenaphthylene | 208-96-8 | Acenaphthene | 83-32-9 |
| Benzo(g,h,i)perylene | 191-24-2 | Pyrene | 129-00-0 |
| Carbazole | 86-74-8 | Fluorene | 86-73-7 |
| Dimethyl phthalate | 131-11-3 | Diethyl phthalate | 84-66-2 |
| Phenanthrene | 85-01-8 | Anthracene | 120-12-7 |
| alpha-Chlordane | 5103-71-9 | Chlordane (technical mixture) | 12789-03-6 |
| delta-BHC | 319-86-8 | beta-BHC | 319-85-7 |
| Endosulfan-I | 959-98-8 | Endosulfan | 115-29-7 |
| Endosulfan-II | 33213-65-9 | Endosulfan | 115-29-7 |
| Endrin aldehyde | 7421-93-4 | Endrin | 72-20-8 |
| Endrin ketone | 53494-70-5 | Endrin | 72-20-8 |
| gamma-Chlordane | 5103-74-2 | Chlordane (technical mixture) | 12789-03-6 |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 2,3,7,8-TCDD | 1746-01-6 |
| Chromium | 7440-47-3 | Chromium, Hexavalent | 18540-29-9 |

Notes:
BHC = beta-Hexachlorocyclohexane; CASRN = Chemical Abstracts Service Registry Number; 2,3,7,8-TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin; TEQ = Toxicity Equivalence Factor

Table 2-15
Modeled Crab Tissue Concentrations Using Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

C-crab (mg/kg) = (CSD/foc) x BSAF x CL
Where: (1,2)

| Parameter | Units | Parameter Definition | Value |
|---|---|---|---|
| C-crab | mg/kg | Concentration in crab | Calculated |
| CSD | mg/kg | Concentration in sediment | Site-specific |
| foc | Unitless | Fraction of organic carbon in sediment | 0.04 |
| BSAF | Unitless | Biota-to-sediment accumulation factor | Chemical-specific |
| CL | Unitless | Fraction of crab lipid content | 0.03 |

| Analyte | CASRN | Class | Units | CSD | Bioaccumulative? (Y/N) (3) | BSAF | BSAF Ref | C-Crab | Lower of RSL Values (6) | Crab Tisue Value Exceeds RSL? |
|---|---|---|---|---|---|---|---|---|---|---|
| 4,4'-DDD | 72-54-8 | PEST | mg/kg | 0.065 | Y | 10.870 | 4 | 0.53 | 0.005 | Yes |
| 4,4'-DDE | 72-55-9 | PEST | mg/kg | 0.149 | Y | 297.101 | 4 | 33 | 0.012 | Yes |
| 4,4'-DDT | 50-29-3 | PEST | mg/kg | 0.011 | Y | 0.042 | 4 | 0.00034 | 0.012 | No |
| Arsenic | 7440-38-2 | TMET | mg/kg | 21.3 | Y | 0.143 | 5 | 2.3 | 0.003 | Yes |
| Cadmium | 7440-43-9 | TMET | mg/kg | 1.5 | Y | 0.6 | 5 | 0.68 | 0.15 | Yes |
| Chromium | 7440-47-3 | TMET | mg/kg | 59 | Y | 0.1 | 5 | 44 | 0.008 | Yes |
| Copper | 7440-50-8 | TMET | mg/kg | 56.5 | Y | 1.556 | 5 | 66 | 6.2 | Yes |
| Fluoranthene | 206-44-0 | SVOC | mg/kg | 0.017 | Y | 20.733 | 4 | 0.26 | 6.2 | No |
| Lead | 7439-92-1 | TMET | mg/kg | 96.9 | Y | 0.071 | 5 | 5.2 | No RSL | No RSL |
| Nickel | 7440-02-0 | TMET | mg/kg | 26 | Y | 0.486 | 5 | 9.5 | 0.005 | Yes |
| Selenium | 7782-49-2 | TMET | mg/kg | 3.4 | Y | 1 | 5 | 2.6 | 0.77 | Yes |
| Silver | 7440-22-4 | TMET | mg/kg | 1.5 | Y | 1 | 5 | 1.1 | 0.77 | Yes |
| Zinc | 7440-66-6 | TMET | mg/kg | 324 | Y | 1.936 | 5 | 470 | 46 | Yes |

Notes and References:

(1) Oregon Department of Environmental Quality (ODEQ), 2007 "Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment".

(2) USEPA, 2005. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Final. EPA530-R-05-006. September 2005.

(3) Calculations were only done for analytes that are bioaccumulative. Table 4-2 of USEPA's "Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment" (February 2000) was used to identify bioaccumulative chemicals.

(4) USACE's Biota-Sediment Accumulation Factor database was used to find BSAF values. https://www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/832015/biota-sediment-accumulation-factor-bsaf-database/

(5) Table 2 median values from Bechtel 1998. Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation. August 1998. 1 is assumed for analytes with no BSAFs.

(6) USEPA Regional Fish Regional Screening Levels (RSLs) (Spring 2021) were used for screening the modeled crab and fish tissue concentrations. The lower of the 2 RSLs was used as the selected RSL criteria:

a) ingestion screening level protective of target risk of 1E-06

b) ingestion screening level protective of target hazard quotient of 0.1

https://www.epa.gov/region-3-documents/regional-fish-regional-screening-levels-rsls-spring-2021

Table 2-16
Modeled Fish Tissue Concentrations Using Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

C-fish (mg/kg) = Conc in Surface Water (CSW) x CF1 × BCF-Fish (chemical's log Kow is < 4.0)
C-fish (mg/kg) = CSW × CF1 × BAF-Fish (chemical's log Kow is > 4.0)
Where: (1)

| Parameter | Units | Parameter Definition | Value |
|---|---|---|---|
| C-fish | mg/kg | Concentration in Fish | Calculated |
| CSW | µg/L | Concentration in surface water | Site-Specific |
| CF1 | mg/µg | Conversion factor 1 | 0.001 |
| BCFish | Unitless | Bioconcentration factor for fish | Chemical-specific |
| BAFish | Unitless | Bioaccumulation factor for fish | Chemical-specific |
| Log Kow | unitless | log octanol-water partition coefficient | Chemical-specific |

| Analyte | CASRN | Class | CSW (µg/L) | Bioaccumulative? (Y/N) (2) | BCF-Fish (3) | BAF-Fish (3) | Log Kow (3) | C-Fish (mg/kg) | Lower of RSL Values (4) | Fish Tisue Value Exceeds RSL? |
|---|---|---|---|---|---|---|---|---|---|---|
| Arsenic | 7440-38-2 | TMET | 11.7 | Y | 300 | -- | -- | 3.510 | 0.003 | Yes |
| Chromium | 7440-47-3 | TMET | 2 | Y | 200 | -- | -- | 0.400 | 0.0083 | Yes |
| Copper | 7440-50-8 | TMET | 4.9 | Y | 200 | No BAF | -- | 0.9800 | 6.2 | No |
| Lead | 7439-92-1 | TMET | 4 | Y | 300 | -- | -- | 1.2 | NA | No SL |
| Nickel | 7440-02-0 | TMET | 2.9 | Y | 100 | -- | -- | 0.29 | 0.0046 | Yes |
| Selenium | 7782-49-2 | TMET | 11.8 | Y | 200 | -- | -- | 2.36 | 0.770 | Yes |

Notes and References:
(1) USEPA, 2005. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Final. EPA530-R-05-006. September 2005.
(2) Calculations were only done for analytes that are bioaccumulative. Table 4-2 of USEPA's "Bioaccumulation Testing and Interpretation for the Purpose of Sediment Quality Assessment" (February 2000) was used to identify bioaccumulative chemicals.
(3) ORNL's Risk Assessment Information System (RAIS) toxicity values and physical parameters database was used to identify Log Kow, BAFs, and BCFs. In this dataset, Log Kow and BAF values could not be found for the bioaccumulative detected chemicals. Therefore, C-Fish was calculated by multiplying BCF, CF1, and CSW.
(4) USEPA Regional Fish Regional Screening Levels (RSLs) (Spring 2021) were used for screening the modeled crab and fish tissue concentrations. The lower of the 2 RSLs was used as the selected RSL criteria:
a) ingestion screening level protective of target risk of 1E-06
b) ingestion screening level protective of target hazard quotient of 0.1
https://www.epa.gov/region-3-documents/regional-fish-regional-screening-levels-rsls-spring-2021

Table 2-17
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | SURFACE AND SUBSURFACE SOIL Parameter | Dioxin/Furan TEF (unitless) | Units | CDL-TP20B-00-010 Subsurface Soil (4 - 4.5 ft bgs) 6/8/2015 Result | LQ | Adj Result (1) pg/g | Adj Result (2) mg/kg |
|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 1 | pg/g | 0.326 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1 | pg/g | 1.635 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 0.1 | pg/g | 1.635 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 0.1 | pg/g | 1.635 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 0.1 | pg/g | 1.83 | J | 0.183 | 1.8E-07 |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 0.01 | pg/g | 46.6 | J | 0.466 | 4.7E-07 |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | 0.0003 | pg/g | 2960 | J | 0.888 | 8.9E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 0.1 | pg/g | 2.3 | J | 0.23 | 2.3E-07 |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 0.03 | pg/g | 1.635 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 0.3 | pg/g | 1.69 | J | 0.507 | 5.1E-07 |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 0.1 | pg/g | 1.635 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 0.1 | pg/g | 1.635 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 0.1 | pg/g | 1.635 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 0.1 | pg/g | 1.635 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 0.01 | pg/g | 9.11 | | 0.0911 | 9.1E-08 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 0.01 | pg/g | 1.635 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | 0.0003 | pg/g | 6.4 | J | 0.00192 | 1.9E-09 |
| | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | | 2.4E-06 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ft bgs = feet below ground surface; mg/kg = milligrams per kilogram; ND = Non-detect; pg/g = picograms per gram; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/g) is derived by mulitplying the detected result (pg/g) by the dioxin/furan TEF (unitless).
(2) The adjusted result (mg/kg) is derived by mulitplying the adjusted result (pg/g) by a conversion factor (CF) of 0.000001. [10-9 pg to 1 mg: 1 g to 10-3 kg = CF of 10-6]

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-17
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | SURFACE AND SUBSURFACE SOIL Parameter | Dioxin/Furan TEF (unitless) | Units | CDL-TP20B-01-010 Subsurface Soil (4 - 4.5 ft bgs) 6/8/2015 Result | LQ | Adj Result (1) pg/g | Adj Result (2) mg/kg |
|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 1 | pg/g | 0.3225 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1 | pg/g | 1.615 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 0.1 | pg/g | 1.615 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 0.1 | pg/g | 2.23 | J | 0.223 | 2.2E-07 |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 0.1 | pg/g | 2.2 | J | 0.22 | 2.2E-07 |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 0.01 | pg/g | 59.5 | J | 0.595 | 6.0E-07 |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | 0.0003 | pg/g | 3750 | J | 1.125 | 1.1E-06 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 0.1 | pg/g | 2.5 | J | 0.25 | 2.5E-07 |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 0.03 | pg/g | 1.615 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 0.3 | pg/g | 1.65 | J | 0.495 | 5.0E-07 |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 0.1 | pg/g | 1.79 | J | 0.179 | 1.8E-07 |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 0.1 | pg/g | 1.615 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 0.1 | pg/g | 2.04 | J | 0.204 | 2.0E-07 |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 0.1 | pg/g | 1.615 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 0.01 | pg/g | 14.4 | J | 0.144 | 1.4E-07 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 0.01 | pg/g | 1.615 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | 0.0003 | pg/g | 10.3 | | 0.00309 | 3.1E-09 |
| | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 3.4E-06 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ft bgs = feet below ground surface; mg/kg = milligrams per kilogram; ND = Non-detect; pg/g = picograms per gram; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/g) is derived by mulitplying the detected result (pg/g) by the dioxin/furan TEF (unitless).
(2) The adjusted result (mg/kg) is derived by mulitplying the adjusted result (pg/g) by a conversion factor (CF) of 0.000001. [10-9 pg to 1 mg: 1 g to 10-3 kg = CF of 10-6]
Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-17
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | SURFACE AND SUBSURFACE SOIL Parameter | Dioxin/Furan TEF (unitless) | Units | CDL-TP27A-00-004 Surface Soil (1 - 1.5 ft bgs) 5/10/2016 Result | LQ | Adj Result (1) pg/g | Adj Result (2) mg/kg |
|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 1 | pg/g | 1.38 | | 1.38 | 1.4E-06 |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1 | pg/g | 5.16 | | 5.16 | 5.2E-06 |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 0.1 | pg/g | 5.71 | | 0.571 | 5.7E-07 |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 0.1 | pg/g | 12.9 | | 1.29 | 1.3E-06 |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 0.1 | pg/g | 11.6 | | 1.16 | 1.2E-06 |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 0.01 | pg/g | 289 | | 2.89 | 2.9E-06 |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | 0.0003 | pg/g | 12600 | J | 3.78 | 3.8E-06 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 0.1 | pg/g | 12.7 | | 1.27 | 1.3E-06 |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 0.03 | pg/g | 7.21 | | 0.2163 | 2.2E-07 |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 0.3 | pg/g | 13.9 | | 4.17 | 4.2E-06 |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 0.1 | pg/g | 10 | | 1 | 1.0E-06 |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 0.1 | pg/g | 9.48 | | 0.948 | 9.5E-07 |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 0.1 | pg/g | 13 | | 1.3 | 1.3E-06 |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 0.1 | pg/g | 2.8 | J | 0.28 | 2.8E-07 |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 0.01 | pg/g | 45.4 | J | 0.454 | 4.5E-07 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 0.01 | pg/g | 3.32 | J | 0.0332 | 3.3E-08 |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | 0.0003 | pg/g | 24.1 | | 0.00723 | 7.2E-09 |
| | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | | 2.6E-05 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ft bgs = feet below ground surface; mg/kg = milligrams per kilogram; ND = Non-detect; pg/g = picograms per gram; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/g) is derived by mulitplying the detected result (pg/g) by the dioxin/furan TEF (unitless).
(2) The adjusted result (mg/kg) is derived by mulitplying the adjusted result (pg/g) by a conversion factor (CF) of 0.000001. [10-9 pg to 1 mg: 1 g to 10-3 kg = CF of 10-6]

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-17
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | SURFACE AND SUBSURFACE SOIL<br>Parameter | Dioxin/Furan TEF<br>(unitless) | Units | CDL-TP27A-01-004<br>Subsurface Soil (1 - 1.5 ft bgs)<br>5/10/2016<br>Result | LQ | Adj Result (1)<br>pg/g | Adj Result (2)<br>mg/kg |
|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 1 | pg/g | 1.2 | | 1.2 | 1.2E-06 |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1 | pg/g | 4.46 | | 4.46 | 4.5E-06 |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 0.1 | pg/g | 4.6 | | 0.46 | 4.6E-07 |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 0.1 | pg/g | 9.75 | | 0.975 | 9.8E-07 |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 0.1 | pg/g | 8.83 | | 0.883 | 8.8E-07 |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 0.01 | pg/g | 208 | | 2.08 | 2.1E-06 |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | 0.0003 | pg/g | 8950 | J | 2.685 | 2.7E-06 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 0.1 | pg/g | 14.1 | J | 1.41 | 1.4E-06 |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 0.03 | pg/g | 7.9 | | 0.237 | 2.4E-07 |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 0.3 | pg/g | 13.7 | | 4.11 | 4.1E-06 |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 0.1 | pg/g | 10.8 | | 1.08 | 1.1E-06 |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 0.1 | pg/g | 9.64 | | 0.964 | 9.6E-07 |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 0.1 | pg/g | 12.8 | | 1.28 | 1.3E-06 |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 0.1 | pg/g | 2.79 | J | 0.279 | 2.8E-07 |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 0.01 | pg/g | 41.2 | J | 0.412 | 4.1E-07 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 0.01 | pg/g | 3.3 | J | 0.033 | 3.3E-08 |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | 0.0003 | pg/g | 22 | | 0.0066 | 6.6E-09 |
| | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | | 2.3E-05 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ft bgs = feet below ground surface; mg/kg = milligrams per kilogram; ND = Non-detect; pg/g = picograms per gram; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/g) is derived by mulitplying the detected result (pg/g) by the dioxin/furan TEF (unitless).
(2) The adjusted result (mg/kg) is derived by mulitplying the adjusted result (pg/g) by a conversion factor (CF) of 0.000001. [10-9 pg to 1 mg: 1 g to 10-3 kg = CF of 10-6]

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW04-00-1928 Groundwater 7/23/2015 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.47E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.74E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.74E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.40E+02 | J | 0.042 | 4.2E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.47E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.74E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.74E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.74E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.74E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.47E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 4.2E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW08-00-1130 Groundwater 7/23/2015 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.67E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.84E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 2.06E+02 | | 0.0618 | 6.2E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.67E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.84E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.84E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.67E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 6.2E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW08-01-1130 Groundwater 7/23/2015 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.67E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.84E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.77E+02 | | 0.0531 | 5.3E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.67E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.84E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.84E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.67E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 5.3E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW15-00-3140 Groundwater 5/5/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.63E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.82E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.82E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 4.74E+01 | J | 0.01422 | 1.4E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.63E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.82E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.82E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.82E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.82E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.82E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.63E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.4E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW16-00-2130 Groundwater 5/4/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.58E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.80E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.50E+02 | | 0.045 | 4.5E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.58E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.80E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.80E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.58E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 4.5E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW16-01-2130 Groundwater 5/4/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.74E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.88E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.88E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.74E-05 | U | -- | -- |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.74E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.88E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.88E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.88E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.88E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.88E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.74E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 0.0E+00 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DPW17-00-1928 Groundwater 5/10/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.61E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.81E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.74E+01 | J | 0.01122 | 1.1E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.61E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.81E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.81E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.61E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.1E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DTW1-00-119128 Groundwater 8/19/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.46E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.81E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.74E+01 | J | 0.01122 | 1.1E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.61E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.81E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.81E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.61E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.1E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DTW1-01-119128 Groundwater 8/19/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.51E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.76E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.76E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 4.41E+02 | | 0.1323 | 1.3E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.51E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.76E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.76E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.76E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.76E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.51E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.3E-07 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DTW2-00-107116 Groundwater 8/26/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.64E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.83E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 7.14E+01 | | 0.714 | 7.1E-07 |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.47E+03 | J | 0.441 | 4.4E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 4.00E+00 | J | 0.4 | 4.0E-07 |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.83E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.83E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 4.12E+01 | J | 0.412 | 4.1E-07 |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.83E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 5.86E+01 | J | 0.01758 | 1.8E-08 |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 2.0E-06 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DTW3-00-097106 Groundwater 8/26/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.79E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.90E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.90E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.79E-05 | U | -- | -- |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.79E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.90E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.90E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.90E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.90E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.79E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 0.0E+00 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-DTW4-00-101110 Groundwater 8/17/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.78E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.90E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.90E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.78E-05 | U | -- | -- |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.78E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.90E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.90E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.90E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.90E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.90E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.78E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 0.0E+00 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW2-00-029048-02 Groundwater 11/15/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.40E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.71E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.71E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.54E+02 | | 0.1062 | 1.1E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.40E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.71E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.71E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.71E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.71E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.71E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.40E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.1E-07 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW3-00-007026 Groundwater 5/13/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.67E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.84E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.38E+02 | | 0.1014 | 1.0E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.67E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.84E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.84E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.84E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.84E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.67E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.0E-07 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW3-00-007026-02 Groundwater 11/15/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.46E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.74E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.74E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 4.58E+02 | | 0.1374 | 1.4E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.46E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.74E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.74E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.74E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.74E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.74E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.46E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-,8-TCDD TEQ Mixture (per Sample) = | 1.4E-07 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW4-00-009028 Groundwater 5/13/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.59E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.80E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.36E+02 | | 0.0408 | 4.1E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.59E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.80E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.80E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.59E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 4.1E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW4-00-009028-02 Groundwater 11/15/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.64E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.83E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.83E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.66E+02 | | 0.0498 | 5.0E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.64E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.83E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.83E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.83E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.83E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.83E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.64E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 5.0E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW4-01-009028 Groundwater 5/13/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.51E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.76E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.76E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.18E+02 | | 0.0354 | 3.5E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.51E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.76E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.76E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.76E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.76E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.76E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.51E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 3.5E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW4-01-009028-02 Groundwater 11/15/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.62E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.81E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 1.23E+02 | | 0.0369 | 3.7E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.62E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.81E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.81E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.81E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.81E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.62E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-7,8-TCDD TEQ Mixture (per Sample) = | 3.7E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW5-00-009028 Groundwater 5/13/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.52E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.77E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.77E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.12E+02 | | 0.0936 | 9.4E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.52E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.77E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.77E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.77E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.77E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.77E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.52E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 9.4E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW5-00-009028-02 Groundwater 11/15/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.58E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.80E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 2.85E+02 | | 0.0855 | 8.6E-08 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.58E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.80E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.80E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.80E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.80E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.58E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-,8-TCDD TEQ Mixture (per Sample) = | 8.6E-08 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-18
Detections of Dioxin-Like Compounds and the Derivation of 2,3,7,8-TCDD Toxicity Equivalence (TEQ) Mixtures for Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| CASRN | Groundwater Parameter | | Dioxin/Furan TEF (unitless) | Units | CDL-MW6-00-023042-02 Groundwater 11/15/2016 Result | LQ | Adj Result (1) pg/l | Adj Result (2) ug/l |
|---|---|---|---|---|---|---|---|---|
| 1746-01-6 | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) | 2,3,7,8-TCDD | 1 | ug/l | 3.45E-06 | U | -- | -- |
| 40321-76-4 | 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (1,2,3,7,8-PeCDD) | 1,2,3,7,8-PeCDD | 1 | ug/l | 1.73E-05 | U | -- | -- |
| 39227-28-6 | 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,4,7,8-HxCDD) | 1,2,3,4,7,8-HxCDD | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 57653-85-7 | 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (1,2,3,6,7,8-HxCDD) | 1,2,3,6,7,8-HxCDD | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 19408-74-3 | 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-HxCDD) | 1,2,3,7,8,9-HxCDD | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 35822-46-9 | 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (1,2,3,4,6,7,8-HpCDD) | 1,2,3,4,6,7,8-HpCDD | 0.01 | ug/l | 1.73E-05 | U | -- | -- |
| 3268-87-9 | 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | OCDD | 0.0003 | ug/l | 3.78E+02 | J | 0.1134 | 1.1E-07 |
| 51207-31-9 | 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF) | 2,3,7,8-TCDF | 0.1 | ug/l | 3.45E-06 | U | -- | -- |
| 57117-41-6 | 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF) | 1,2,3,7,8-PeCDF | 0.03 | ug/l | 1.73E-05 | U | -- | -- |
| 57117-31-4 | 2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF) | 2,3,4,7,8-PeCDF | 0.3 | ug/l | 1.73E-05 | U | -- | -- |
| 70648-26-9 | 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF) | 1,2,3,4,7,8-HxCDF | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 57117-44-9 | 1,2,3,6,7,8-Hexachlorodibenzofuran (1,2,3,6,7,8-HxCDF) | 1,2,3,6,7,8-HxCDF | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 60851-34-5 | 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF) | 2,3,4,6,7,8-HxCDF | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 72918-21-9 | 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF) | 1,2,3,7,8,9-HxCDF | 0.1 | ug/l | 1.73E-05 | U | -- | -- |
| 67562-39-4 | 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF) | 1,2,3,4,6,7,8-HpCDF | 0.01 | ug/l | 1.73E-05 | U | -- | -- |
| 55673-89-7 | 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) | 1,2,3,4,7,8,9-HpCDF | 0.01 | ug/l | 1.73E-05 | U | -- | -- |
| 39001-02-0 | 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | OCDF | 0.0003 | ug/l | 3.45E-05 | U | -- | -- |
| | | | | | | | 2,3,7,8-TCDD TEQ Mixture (per Sample) = | 1.1E-07 |

Notes:

CASRN = Chemical Abstracts Service Registry Number; ug/l = micrograms per liter; ND = Non-detect; pg/l = picograms per liter; TEF = Toxicity Equivalence Factor; TEQ = Toxicity Equivalence

(1) The adjusted result (pg/l) is derived by mulitplying the detected result (ug/l) by the dioxin/furan TEF (unitless).

(2) The adjusted result (ug/L) is derived by mulitplying the adjusted result (pg/L) by a conversion factor (CF) of 0.000001.

Lab Qualifiers (LQ): U = Undetected at the laboratory reporting limit; J = Estimated Concentration;

Table 2-1.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Northern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Background Threshold Value (1) | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 5110 | | 14300 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 14300 | MDC | 13900 | Yes | MDC > BTV, retain COPC |
| Arsenic | 7440-38-2 | 1.1 | | 2.5 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 2.5 | MDC | 13.72 | No | MDC < BTV, exclude COPC |
| Chromium | 7440-47-3 | 4.8 | | 11.5 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 11.5 | MDC | 18.4 | No | MDC < BTV, exclude COPC |
| Cobalt | 7440-48-4 | 1.2 | B | 3.3 | B | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 3.3 | MDC | 7.3 | No | MDC < BTV, exclude COPC |
| Iron | 7439-89-6 | 3460 | | 8880 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 8880 | MDC | 10900 | No | MDC < BTV, exclude COPC |
| Thallium | 7440-28-0 | 0.059 | B | 0.18 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.18 | MDC | 0.76 | No | MDC < BTV, exclude COPC |

Notes:

% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-2.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Northern AOC; Subsurface Soil, 2 - 17.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals | | | | | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 0.91 | | 1.1 | | mg/kg | DPT10 (7/21/2015) | 7.5 – 8 | 3/3 | 100% | N/A | 1.1 | MDC | 5.3 | No | MDC < BTV, exclude COPC |
| Chromium | 7440-47-3 | 5.5 | | 12 | | mg/kg | Multiple Locations | N/A | 3/3 | 100% | N/A | 12 | MDC | 21 | No | MDC < BTV, exclude COPC |

Notes:
% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-3.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Western AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Screening Concentration | | Background Threshold Value (1) | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7010 | | 13300 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 13300 | MDC | 13900 | No | MDC < BTV, exclude COPC |
| Arsenic | 7440-38-2 | 1.7 | | 4.4 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 4.4 | MDC | 13.72 | No | MDC < BTV, exclude COPC |
| Chromium | 7440-47-3 | 6.5 | | 11.4 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 11.4 | MDC | 18.4 | No | MDC < BTV, exclude COPC |
| Cobalt | 7440-48-4 | 1.6 | B | 4.3 | B | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 4.3 | MDC | 7.3 | No | MDC < BTV, exclude COPC |
| Iron | 7439-89-6 | 4080 | | 10600 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 10600 | MDC | 10900 | No | MDC < BTV, exclude COPC |
| Thallium | 7440-28-0 | 0.029 | B | 0.079 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 0.079 | MDC | 0.76 | No | MDC < BTV, exclude COPC |

Notes:

% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-4.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Central AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | |
| Benzo(a)anthracene | 56-55-3 | 1.77 | | 2.49 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000017 – 0.00002 | 2.49 | MDC | No BTV | -- | -- |
| Benzo(a)pyrene | 50-32-8 | 1.59 | | 1.91 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000014 | 1.91 | MDC | 0.41 | Yes | MDC > BTV, retain COPC |
| Benzo(b)fluoranthene | 205-99-2 | 1.11 | | 1.39 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000016 – 0.000019 | 1.39 | MDC | No BTV | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | 0.388 | J | 0.388 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.000018 – 0.00012 | 0.388 | MDC | No BTV | -- | -- |
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 4600 | | 21100 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 21100 | MDC | 13900 | Yes | MDC > BTV, retain COPC |
| Arsenic | 7440-38-2 | 1.7 | | 4.8 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 4.8 | MDC | 13.72 | No | MDC < BTV, exclude COPC |
| Chromium | 7440-47-3 | 5.3 | | 126 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 126 | MDC | 18.4 | Yes | MDC > BTV, retain COPC |
| Cobalt | 7440-48-4 | 1.5 | B | 28 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 28 | MDC | 7.3 | Yes | MDC > BTV, retain COPC |
| Iron | 7439-89-6 | 3520 | | 24800 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 24800 | MDC | 10900 | Yes | MDC > BTV, retain COPC |
| Manganese | 7439-96-5 | 40.4 | | 372 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 372 | MDC | 781 | No | MDC < BTV, exclude COPC |
| Nickel | 7440-02-0 | 2.9 | B | 502 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 502 | MDC | 10.6 | Yes | MDC > BTV, retain COPC |
| Thallium | 7440-28-0 | 0.03 | B | 0.2 | B | mg/kg | P-1A (BURN AREA) (4/9/200 | 0 – 0.5 | 9/9 | 100% | N/A | 0.2 | MDC | 0.76 | No | MDC < BTV, exclude COPC |

Notes:

% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-5.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Central AOC; Subsurface Soil, 2 - 17 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | |
| 1,1,2-Trichloroethane | 79-00-5 | 25 | J | 28 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 2/15 | 13% | 0.0000037 – 0.000072 | 28 | MDC | No BTV | -- | -- |
| 2-Hexanone | 591-78-6 | 86 | J | 86 | J | mg/kg | TP13B (6/4/2015) | 4.5 – 5 | 1/15 | 7% | 0.000007 – 0.00018 | 86 | MDC | No BTV | -- | -- |
| Benzene | 71-43-2 | 0.185 | | 3 | J | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 4/15 | 27% | 0.0000035 – 0.00005 | 3 | MDC | No BTV | -- | -- |
| Ethylbenzene | 100-41-4 | 0.361 | | 16 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 7/15 | 47% | 0.0000037 – 0.0000053 | 16 | MDC | No BTV | -- | -- |
| Naphthalene | 91-20-3 | 0.096 | J | 12 | | mg/kg | DPT1 (7/21/2015) | 13 – 13.5 | 9/16 | 56% | 0.000018 – 0.000022 | 12 | MDC | No BTV | -- | -- |
| Xylene (total) | 1330-20-7 | 0.229 | | 59 | | mg/kg | TP13C (6/4/2015) | 2.5 – 3 | 9/16 | 56% | 0.0000074 – 0.000011 | 59 | MDC | No BTV | -- | -- |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | |
| Benzo(a)anthracene | 56-55-3 | 0.13 | J | 27 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000017 – 0.000021 | 27 | MDC | No BTV | -- | -- |
| Benzo(a)pyrene | 50-32-8 | 0.085 | J | 23 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000012 – 0.000021 | 23 | MDC | No BTV | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | 0.12 | J | 29 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 7/16 | 44% | 0.000016 – 0.000021 | 29 | MDC | No BTV | -- | -- |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.037 | J | 9.6 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 6/16 | 38% | 0.000018 – 0.000025 | 9.6 | MDC | No BTV | -- | -- |
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 3380 | | 18000 | B | mg/kg | TP11B (5/28/2015) | 11 – 12 | 16/16 | 100% | N/A | 18000 | MDC | 22400 | No | MDC < BTV, exclude COPC |
| Antimony | 7440-36-0 | 0.59 | J | 17 | | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 4/16 | 25% | 0.8 – 0.9 | 17 | MDC | No BTV | -- | -- |
| Arsenic | 7440-38-2 | 0.63 | J | 59 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 15/16 | 94% | 0.39 – 0.39 | 59 | MDC | 5.3 | Yes | MDC > BTV, retain COPC |
| Chromium | 7440-47-3 | 2.8 | | 63 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 63 | MDC | 21 | Yes | MDC > BTV, retain COPC |
| Cobalt | 7440-48-4 | 0.36 | J | 12 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 12 | MDC | 8.8 | Yes | MDC > BTV, retain COPC |
| Iron | 7439-89-6 | 1390 | | 35000 | | mg/kg | TP26B (5/11/2016) | 4 – 4.5 | 16/16 | 100% | N/A | 35000 | MDC | 24200 | Yes | MDC > BTV, retain COPC |
| Lead | 7439-92-1 | 2.6 | | 4900 | | mg/kg | DPT2 (7/22/2015) | 9.5 – 10 | 16/16 | 100% | N/A | 4900 | MDC | 12.2 | Yes | MDC > BTV, retain COPC |

Notes:

% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-6.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | 50-32-8 | 0.01 | J | 0.117 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 4/14 | 29% | 0.000013 – 0.000022 | 0.117 | MDC | 0.41 | No | MDC < BTV, exclude COPC |
| Pesticides | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0013 | J | 0.197 | | mg/kg | '-4B (BURN AREA) (4/9/200 | 0.5 – 2 | 7/10 | 70% | 0.00000035 – 0.00000043 | 0.197 | MDC | No BTV | -- | -- |
| Dioxins and Furans | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.000208 | | 0.000289 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.000289 | MDC | No BTV | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.0000412 | J | 0.0000454 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000454 | MDC | No BTV | -- | -- |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | 0.0000033 | J | 0.00000332 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000332 | MDC | No BTV | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | 0.0000046 | | 0.00000571 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000571 | MDC | No BTV | -- | -- |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | 0.00001 | | 0.0000108 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000108 | MDC | No BTV | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000975 | | 0.0000129 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000129 | MDC | No BTV | -- | -- |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | 0.00000948 | | 0.00000964 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000964 | MDC | No BTV | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.00000883 | | 0.0000116 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000116 | MDC | No BTV | -- | -- |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | 0.00000279 | J | 0.0000028 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000028 | MDC | No BTV | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | 0.00000721 | | 0.0000079 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000079 | MDC | No BTV | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | 0.00000446 | | 0.00000516 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000516 | MDC | No BTV | -- | -- |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | 0.0000128 | | 0.000013 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.000013 | MDC | No BTV | -- | -- |
| 2,3,4,7,8-PECDF | 57117-31-4 | 0.0000137 | | 0.0000139 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000139 | MDC | No BTV | -- | -- |
| 2,3,7,8-TCDD | 1746-01-6 | 0.0000012 | | 0.00000138 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000138 | MDC | No BTV | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.0000127 | | 0.0000141 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000141 | MDC | No BTV | -- | -- |
| OCDD | 3268-87-9 | 0.00895 | J | 0.0126 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0126 | MDC | No BTV | -- | -- |
| OCDF | 39001-02-0 | 0.000022 | | 0.0000241 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000241 | MDC | No BTV | -- | -- |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0000225 | | 0.0000258 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000258 | MDC | No BTV | -- | -- |
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7060 | | 38600 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 38600 | MDC | 13900 | Yes | MDC > BTV, retain COPC |
| Antimony | 7440-36-0 | 2.8 | J | 63.7 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 9/14 | 64% | 0.82 – 0.97 | 63.7 | MDC | No BTV | -- | -- |
| Arsenic | 7440-38-2 | 3 | | 8.4 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 8.4 | MDC | 13.72 | No | MDC < BTV, exclude COPC |
| Cadmium | 7440-43-9 | 0.21 | B | 21.6 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 13/14 | 93% | 0.16 – 0.16 | 21.6 | MDC | 0.381 | Yes | MDC > BTV, retain COPC |
| Chromium | 7440-47-3 | 8 | | 616 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 616 | MDC | 18.4 | Yes | MDC > BTV, retain COPC |
| Cobalt | 7440-48-4 | 2.5 | B | 15 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 15 | MDC | 7.3 | Yes | MDC > BTV, retain COPC |
| Copper | 7440-50-8 | 5.3 | | 5100 | | mg/kg | -7B (BURN AREA) (4/10/20 | 0.5 – 2 | 14/14 | 100% | N/A | 5100 | MDC | 17.8 | Yes | MDC > BTV, retain COPC |
| Iron | 7439-89-6 | 5970 | | 160000 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 160000 | MDC | 10900 | Yes | MDC > BTV, retain COPC |
| Lead | 7439-92-1 | 5.4 | | 2120 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 2120 | MDC | 84.8 | Yes | MDC > BTV, retain COPC |
| Manganese | 7439-96-5 | 148 | | 1490 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 1490 | MDC | 781 | Yes | MDC > BTV, retain COPC |
| Mercury | 7439-97-6 | 0.04 | | 1.8 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 1.8 | MDC | 0.11 | Yes | MDC > BTV, retain COPC |
| Silver | 7440-22-4 | 0.18 | B | 84.5 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 10/14 | 71% | 0.17 – 0.3 | 84.5 | MDC | 0.3 | Yes | MDC > BTV, retain COPC |
| Thallium | 7440-28-0 | 0.045 | B | 0.15 | B | mg/kg | SB-3B (4/18/2007) | 0.5 – 2 | 5/14 | 36% | 0.043 – 1.6 | 0.15 | MDC | 0.76 | No | MDC < BTV, exclude COPC |
| Vanadium | 7440-62-2 | 11 | | 51 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 51 | MDC | 28.5 | Yes | MDC > BTV, retain COPC |
| Zinc | 7440-66-6 | 16.4 | | 4280 | | mg/kg | '-3A (BURN AREA) (4/9/200 | 0 – 0.5 | 14/14 | 100% | N/A | 4280 | MDC | 53.5 | Yes | MDC > BTV, retain COPC |

Table 2-6.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Southern AOC; Surface Soil, 0 - 2 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits [(1)] | Screening Concentration | Background Threshold Value [(1)] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Notes:
% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-7.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Screening Concentration | | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | |
| Benzo(a)pyrene | 50-32-8 | 0.044 | J | 0.27 | J | mg/kg | TP21A (6/9/2015) | 3 – 3.5 | 2/12 | 17% | 0.000014 – 0.000024 | 0.27 | MDC | No BTV | -- | -- |
| Dioxins and Furans | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.0000466 | J | 0.0000595 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000595 | MDC | No BTV | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.00000911 | | 0.0000144 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000144 | MDC | No BTV | -- | -- |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 3.23E-06 – 3.27E-06 | 0.00000327 | MDL | No BTV | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 3.23E-06 – 3.27E-06 | 0.00000327 | MDL | No BTV | -- | -- |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | 0.00000179 | J | 0.00000179 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/2 | 50% | 3.27E-06 – 3.27E-06 | 0.00000179 | MDC | No BTV | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000223 | J | 0.00000223 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/2 | 50% | 3.27E-06 – 3.27E-06 | 0.00000223 | MDC | No BTV | -- | -- |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 3.23E-06 – 3.27E-06 | 0.00000327 | MDL | No BTV | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.00000183 | J | 0.0000022 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000022 | MDC | No BTV | -- | -- |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 3.23E-06 – 3.27E-06 | 0.00000327 | MDL | No BTV | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 3.23E-06 – 3.27E-06 | 0.00000327 | MDL | No BTV | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 3.23E-06 – 3.27E-06 | 0.00000327 | MDL | No BTV | -- | -- |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | 0.00000204 | J | 0.00000204 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 1/2 | 50% | 3.27E-06 – 3.27E-06 | 0.00000204 | MDC | No BTV | -- | -- |
| 2,3,4,7,8-PECDF | 57117-31-4 | 0.00000165 | J | 0.00000169 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.00000169 | MDC | No BTV | -- | -- |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 6.45E-07 – 6.52E-07 | 6.52E-07 | MDL | No BTV | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.0000023 | J | 0.0000025 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000025 | MDC | No BTV | -- | -- |
| OCDD | 3268-87-9 | 0.00296 | J | 0.00375 | J | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.00375 | MDC | No BTV | -- | -- |
| OCDF | 39001-02-0 | 0.0000064 | J | 0.0000103 | | mg/kg | TP20B (6/8/2015) | 4 – 4.5 | 2/2 | 100% | N/A | 0.0000103 | MDC | No BTV | -- | -- |
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 6400 | B | 79300 | J | mg/kg | -3C (BURN AREA) (4/9/20 | 4 – 5 | 12/12 | 100% | N/A | 79300 | MDC | 22400 | Yes | MDC > BTV, retain COPC |
| Antimony | 7440-36-0 | 0.73 | J | 510 | | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 10/12 | 83% | 0.83 – 0.88 | 510 | MDC | No BTV | -- | -- |
| Arsenic | 7440-38-2 | 2.6 | J | 52 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 52 | MDC | 5.3 | Yes | MDC > BTV, retain COPC |
| Cadmium | 7440-43-9 | 0.027 | J | 75.3 | J | mg/kg | -3C (BURN AREA) (4/9/20 | 4 – 5 | 12/12 | 100% | N/A | 75.3 | MDC | 0.36 | Yes | MDC > BTV, retain COPC |
| Chromium | 7440-47-3 | 8.6 | | 140 | J | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 12/12 | 100% | N/A | 140 | MDC | 21 | Yes | MDC > BTV, retain COPC |
| Cobalt | 7440-48-4 | 2.5 | J | 28 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 28 | MDC | 8.8 | Yes | MDC > BTV, retain COPC |
| Copper | 7440-50-8 | 6.5 | | 6700 | B | mg/kg | DPT8 (7/23/2015) | 4.5 – 5 | 12/12 | 100% | N/A | 6700 | MDC | 10.9 | Yes | MDC > BTV, retain COPC |
| Iron | 7439-89-6 | 8900 | | 250000 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 250000 | MDC | 24200 | Yes | MDC > BTV, retain COPC |
| Lead | 7439-92-1 | 6 | | 22000 | | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 12/12 | 100% | N/A | 22000 | MDC | 12.2 | Yes | MDC > BTV, retain COPC |
| Manganese | 7439-96-5 | 140 | | 1600 | | mg/kg | TP18B (6/9/2015) | 3.5 – 4 | 12/12 | 100% | N/A | 1600 | MDC | 213 | Yes | MDC > BTV, retain COPC |
| Silver | 7440-22-4 | 4.3 | | 45.5 | | mg/kg | -3C (BURN AREA) (4/9/20 | 4 – 5 | 9/12 | 75% | 0.27 – 0.3 | 45.5 | MDC | 0.22 | Yes | MDC > BTV, retain COPC |
| Zinc | 7440-66-6 | 20 | | 5400 | | mg/kg | DPT4 (7/23/2015) | 7 – 7.5 | 12/12 | 100% | N/A | 5400 | MDC | 26.3 | Yes | MDC > BTV, retain COPC |

Notes:
% = Percent
BTVs = Background Threshold Values
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface

Table 2-7.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Southern AOC; Subsurface Soil, 2 - 9.5 feet)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (> 2 ft) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits [1] | Screening Concentration | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

Table 2-8.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits | Screening Concentration | | Background Threshold Value [1] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | | | |
| 1,2-Dichloroethane | 107-06-2 | 0.2 | J | 17.6 | | µg/L | MW-05 (12/18/2007) | 23 – 33 | 4/50 | 8% | 0.29 – 2.9 | 17.6 | MDC | No BTV | -- | -- |
| Benzene | 71-43-2 | 0.77 | J | 2100 | | µg/L | DPW2 (7/22/2015) | 10 – 15 | 7/50 | 14% | 0.19 – 2.1 | 2100 | MDC | No BTV | -- | -- |
| Chloroform | 67-66-3 | 0.72 | J | 0.72 | J | µg/L | DTW2 (8/26/2016) | 52 – 57 | 1/50 | 2% | 0.22 – 2.5 | 0.72 | MDC | No BTV | -- | -- |
| cis-1,2-Dichloroethene | 156-59-2 | 0.37 | J | 54.5 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 8/50 | 16% | 0.18 – 0.8 | 54.5 | MDC | No BTV | -- | -- |
| Ethylbenzene | 100-41-4 | 2.9 | | 1300 | | µg/L | Multiple Locations | N/A | 15/50 | 30% | 0.2 – 0.8 | 1300 | MDC | No BTV | -- | -- |
| Isopropylbenzene | 98-82-8 | 0.47 | J | 91 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 16/50 | 32% | 0.2 – 0.8 | 91 | MDC | No BTV | -- | -- |
| m,p-Xylene | 179601-23-1 | 1490 | | 2180 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 3/12 | 25% | 0.35 – 0.42 | 2180 | MDC | No BTV | -- | -- |
| Naphthalene | 91-20-3 | 0.063 | J | 120 | | µg/L | Multiple Locations | N/A | 22/51 | 43% | 0.16 – 0.35 | 120 | MDC | No BTV | -- | -- |
| o-Xylene | 95-47-6 | 416 | | 859 | | µg/L | MW-04 (12/18/2007) | 4 – 14 | 3/12 | 25% | 0.2 – 0.31 | 859 | MDC | No BTV | -- | -- |
| Tetrachloroethene | 127-18-4 | 3.6 | J | 14 | J | µg/L | Multiple Locations | N/A | 7/50 | 14% | 0.28 – 0.8 | 14 | MDC | No BTV | -- | -- |
| Toluene | 108-88-3 | 6.5 | | 9800 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 16/50 | 32% | 0.2 – 0.8 | 9800 | MDC | No BTV | -- | -- |
| Trichloroethene | 79-01-6 | 3.1 | J | 3.6 | J | µg/L | MW-04 (5/2/2007) | 4 – 14 | 2/50 | 4% | 0.26 – 2.6 | 3.6 | MDC | No BTV | -- | -- |
| Xylene (total) | 1330-20-7 | 14 | | 4800 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 16/50 | 32% | 0.2 – 0.8 | 4800 | MDC | No BTV | -- | -- |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1.1 | | 5.5 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 14/51 | 27% | 0.22 – 0.44 | 5.5 | MDC | No BTV | -- | -- |
| 2-Methylnaphthalene | 91-57-6 | 0.065 | J | 71 | | µg/L | DPW3 (7/22/2015) | 5 – 10 | 19/51 | 37% | 0.1 – 0.76 | 71 | MDC | No BTV | -- | -- |
| Benzo(a)anthracene | 56-55-3 | 0.13 | J | 0.55 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.16 – 0.39 | 0.55 | MDC | No BTV | -- | -- |
| Benzo(a)pyrene | 50-32-8 | 0.088 | J | 0.34 | J | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 2/51 | 4% | 0.16 – 0.78 | 0.34 | MDC | No BTV | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | 0.11 | J | 0.32 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 3/51 | 6% | 0.16 – 0.75 | 0.32 | MDC | No BTV | -- | -- |
| Dibenzofuran | 132-64-9 | 0.19 | J | 3.6 | | µg/L | DPW1 (7/21/2015) | 14.5 – 19.5 | 7/51 | 14% | 0.23 – 0.44 | 3.6 | MDC | No BTV | -- | -- |
| Dioxins and Furans | | | | | | | | | | | | | | | | |
| Total TEQ (WHO 2005) ND = 0.5 | TEQ_2005_0.5 | 0.0000195 | | 0.0000224 | | µg/L | DTW2 (8/26/2016) | 52 – 57 | 22/22 | 100% | N/A | 0.0000224 | MDC | No BTV | -- | -- |
| Total Metals | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 38.6 | B | 55000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 18/51 | 35% | 23 – 200 | 55000 | MDC | 189 | Yes | MDC > BTV, retain COPC |
| Antimony | 7440-36-0 | 1 | B | 1 | B | µg/L | MW-05 (12/18/2007) | 23 – 33 | 1/51 | 2% | 0.9 – 15 | 1 | MDC | 2.2 | No | MDC < BTV, exclude COPC |
| Arsenic | 7440-38-2 | 1.7 | B | 71 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 20/51 | 39% | 0.94 – 8 | 71 | MDC | No BTV | -- | -- |
| Barium | 7440-39-3 | 3.3 | B | 890 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 51/51 | 100% | N/A | 890 | MDC | 43 | Yes | MDC > BTV, retain COPC |
| Beryllium | 7440-41-7 | 5.6 | | 5.6 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 1/51 | 2% | 0.15 – 10 | 5.6 | MDC | No BTV | -- | -- |
| Cadmium | 7440-43-9 | 0.3 | B | 5 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 5/51 | 10% | 0.24 – 10 | 5 | MDC | No BTV | -- | -- |
| Chromium | 7440-47-3 | 0.78 | J | 33 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 19/51 | 37% | 0.53 – 10 | 33 | MDC | 1.2 | Yes | MDC > BTV, retain COPC |
| Cobalt | 7440-48-4 | 1.3 | J | 42 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 13/51 | 25% | 0.15 – 13 | 42 | MDC | No BTV | -- | -- |
| Iron | 7439-89-6 | 19.8 | B | 100000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 41/51 | 80% | 25 – 80 | 100000 | MDC | 995.8 | Yes | MDC > BTV, retain COPC |
| Lead | 7439-92-1 | 1.6 | B | 140 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 18/51 | 35% | 2.8 – 10 | 140 | MDC | No BTV | -- | -- |
| Manganese | 7439-96-5 | 1.7 | B | 4000 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 49/51 | 96% | 1.5 – 1.5 | 4000 | MDC | 147 | Yes | MDC > BTV, retain COPC |
| Mercury | 7439-97-6 | 0.029 | J | 0.3 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 11/51 | 22% | 0.1 – 10 | 0.3 | MDC | No BTV | -- | -- |
| Thallium | 7440-28-0 | 1.3 | | 1.3 | | µg/L | MW-06 (12/18/2007) | 11 – 21 | 1/51 | 2% | 0.48 – 25 | 1.3 | MDC | No BTV | -- | -- |
| Vanadium | 7440-62-2 | 0.9 | B | 59 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 13/51 | 25% | 0.49 – 25 | 59 | MDC | No BTV | -- | -- |
| Zinc | 7440-66-6 | 2.3 | J | 2900 | | µg/L | MW-05 (11/15/2016) | 23 – 33 | 30/51 | 59% | 2.7 – 10 | 2900 | MDC | 7.8 | Yes | MDC > BTV, retain COPC |

Table 2-8.BTV
Background Threshold Value Comparison for Constituents of Potential Concern (Direct Contact – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | Range of Detection Limits | Screening Concentration | Background Threshold Value [(1)] | Screening Concentration exceeds BTV? | Retain COPC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

Notes:
% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPC = Chemical of Potential Concern
ft bgs = feet below gound surface
J = Estimated Concentration
MDL = Method Detection Limit
MDC = Maximum Detected Concentration
N/A = Not Applicable
ND = Non-Detect or Not Detected
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency
(1) Background Threshold Values for Molena soil series from the Background Threshold Values Report for Soil and Groundwater, Wallops Flight Facility Wallops Island, Virginia. Tetra Tech Inc. September 2021.

# Attachment 3

## Human Health Exposure Assessment Calculations

# Values Used for Daily Intake and Dermally Absorbed Dose Calculations: Reasonable Maximum Exposure

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Hypothetical Resident (Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSA | Ingestion Rate, soil - adult | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATnc,a}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Hypothetical Resident (Future) | Child | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSC | Ingestion Rate, soil - child | 200 | mg/day | USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATnc,c}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Hypothetical Resident (Future) | Lifetime | Ingestion of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where IFSMadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ $\frac{EF \times IR_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 166833.3333 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | IRSA | Ingestion Rate, soil - adult | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | IRSC | Ingestion Rate, soil - child | 200 | mg/day | USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Hypothetical Resident (Future) | Lifetime | Ingestion of Soil | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times (ED_{0-2} + ED_{2-6}) + \frac{EF \times IR_a}{BW_a} \times (ED_{6-16} + ED_{16-26})$ |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = $CS \times \left( \frac{IFS_{res-adj} \times RBA \times CF1 \times FI}{AT_c} + \frac{IR\text{-}S_c \times RBA \times CF1 \times FI}{BW_c} \right)$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 36750 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Ingestion | On-Site Recreator (Current/Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSA | Ingestion Rate, soil - adult | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATnc,a}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |
| Ingestion | On-Site Recreator (Current/Future) | Child | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSC | Ingestion Rate, soil - child | 200 | mg/day | USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATnc,c}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | On-Site Recreator (Current/Future) | Lifetime | Ingestion of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where IFSMadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ $\frac{EF \times IR_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 92950 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | |
| | | | | IRSA | Ingestion Rate, soil - adult | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | IRSC | Ingestion Rate, soil - child | 200 | mg/day | USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times IR_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = $CS \times \left(\frac{IFS_{res-adj} \times RBA \times CF1 \times FI}{AT_c} + \frac{IR\text{-}S_c \times RBA \times CF1 \times FI}{BW_c}\right)$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 20475 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (teen) = $\frac{CS \times IRS \times RBA \times EF \times FI\text{-}S \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRS | Ingestion Rate, soil | 100 | mg/day | USEPA, 2011 (Table ES-1; general population central tendency value (soil + dust) for 6 to < 21 years) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (teen) = $\frac{CS \times IRS \times RBA \times EF \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATnc}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | |
| | | | | ED6-16 | Exposure Duration | 10 | years | Site-specific assumption (Youth is 6-16 years old) | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Daily Intake (mg/kg-day) for mutagenic carcinogens = $\frac{CS \times RBA \times IFSMadj \times FI\text{-}S \times CF1}{ATc}$ |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFSMadj (mg/kg) = $\frac{EF \times IRS}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Soil | IFSadj | Ingestion Rate - Age-adjusted | 545.4545455 | mg/kg | See equations | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 1636.363636 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = $\frac{EF \times IRS}{BW_{6-16}} \times (ED_{6-16})$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Ingestion | Outdoor Maintenace Worker (Current/Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRS | Ingestion Rate, soil | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATnc}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 225 | days/year | USEPA, 2002 | |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Indoor/Outdoor Commercial Worker (Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRS | Ingestion Rate, soil | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATnc}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 1991 | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

Scenario Timeframe: See Below
Medium: Soil
Exposure Medium: Soil

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Construction Worker (Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | CS x IRS x RBA x EF x FI-S x ED x CF1 / BW x ATc |
| | | | | IRS | Ingestion Rate, soil | 330 | mg/day | USEPA, 2002 | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | IRS x RBA x EF x FI-S x ED x CF1 / BW x ATnc |
| | | | | EF | Exposure Frequency | 250 | days/year | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Dermal Absorption | Hypothetical Resident (Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATnc,a |
| | | | | SAa | Skin Surface Area, adult | 6032 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.07 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| Dermal Absorption | Hypothetical Resident (Future) | Child | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATnc,c |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Hypothetical Resident (Future) | Child | Dermal Absorption of Soil | SAc | Skin Surface Area, child | 2373 | $cm^2$ | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Where:<br>DA-event (Absorbed Dose per Event [mg/$cm^2$-event]) =<br>CS x CF1 x AFc x ABS |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) =<br>[DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.2 | mg/$cm^2$-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Hypothetical Resident (Future) | Lifetime | Dermal Absorption of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) =<br>$\frac{CS \times ABS \times FC\text{-}S \times CF1 \times DFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where DFSMadj (mg/kg) =<br>$\frac{EF \times AF_c \times EV \times SA_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right]$<br>$\frac{EF \times AF_a \times EV \times SA_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 428260 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.2 | mg/$cm^2$-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario) | |
| | | | | SAc | Skin Surface Area, child | 2373 | $cm^2$ | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) =<br>$\frac{CS \times ABS \times FC\text{-}S \times CF1 \times (CAFd \times DFSadj + MAFd \times DFSMadj)}{ATc}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Where DFSadj (mg/kg) =<br>$\frac{EF \times AF_c \times EV \times SA_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times AF_a \times EV \times SA_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) =<br>$CS \times FC\text{-}S \times \left(\frac{DFS_{adj} \times ABS \times CF1}{AT_c} + \frac{SA_c \times ABS \times CF1 \times EV \times AF_c}{BW_c}\right)$ |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.07 | mg/$cm^2$-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario) | |
| | | | | SAa | Skin Surface Area, adult | 6032 | $cm^2$ | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Hypothetical Resident (Future) | Lifetime | Dermal Absorption of Soil | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CAFd | Cancer Adjustment Factor, dermal | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 103390 | mg/kg | See equations | |
| | | | | MAFd | Mutagenic Adjustment Factor, dermal | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Current/Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATnc,a |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | SAa | Skin Surface Area, adult | 6032 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.07 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Current/Future) | Child | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATnc,c |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | SAc | Skin Surface Area, child | 2373 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Where: DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFc x ABS |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Current/Future) | Child | Dermal Absorption of Soil | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.2 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Current/Future) | Lifetime | Dermal Absorption of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times ABS \times FC\text{-}S \times CF1 \times DFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where DFSMadj (mg/kg) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 238602 | mg/kg | See equations | $\frac{EF \times EV \times AF_c \times SA_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | $\frac{EF \times EV \times AF_a \times SA_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.2 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario) | |
| | | | | SAc | Skin Surface Area, child | 2373 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times ABS \times FC\text{-}S \times CF1 \times (CAFd \times DFSadj + MAFd \times DFSMadj)}{ATc}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Where DFSadj (mg/kg) = |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{EF \times EV \times AF_c \times SA_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times EV \times AF_a \times SA_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.07 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario) | $CS \times FC\text{-}S \times \left(\frac{DFS_{res-adj} \times ABS \times CF1}{ATc} + \frac{SA_c \times ABS \times CF1 \times EV \times AF_c}{BW_c}\right)$ |
| | | | | SAa | Skin Surface Area, adult | 6032 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CAFd | Cancer Adjustment Factor, dermal | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 57603 | mg/kg | See equations | |
| | | | | MAFd | Mutagenic Adjustment Factor, dermal | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Soil | | | | | | |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Non-Mutagenic Constituents |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (teen) = |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | $\frac{\text{DA-event x EV x EF x FC-S x ED6-16 x SA6-16}}{\text{BW6-16 x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (teen) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | $\frac{\text{DA-event x EV x EF x FC-S x ED6-16 x SA6-16}}{\text{BW6-16 x ATnc}}$ |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.04 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for soccer player #1 (teens, moist conditions)) | Where: |
| | | | | SA6-16 | Skin Surface Area | 3749 | cm² | USEPA 2011 (Tables 7-2; weighted average of mean values for head, hands, forearms, and lower legs (male and female, 6 to <16 years)) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens = |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | $\frac{\text{CS x ABS x FC-S x CF1 x DFSMadj}}{\text{ATc}}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | $\frac{\text{CS x ABS x FC-S x CF1 x (CAFo x DFSadj + MAFo x DFSMadj)}}{\text{ATc}}$ |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 1431.436364 | mg/kg | See equations | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 4294.309091 | mg/kg | See equations | Where DFSMadj (mg/kg) = |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | | | | | | Where DFSadj (mg/kg) = |
| | | | | | | | | | $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times \left(ED_{6-16}\right)$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Dermal Absorption | Outdoor Maintenace Worker (Current/Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 225 | days/year | USEPA, 2002 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Outdoor Maintenace Worker (Current/Future) | Adult | Dermal Absorption of Soil | AF | Soil-to-skin Adherence Factor | 0.12 | mg/cm²-event | USEPA, 2014 (USEPA, 2011; Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Indoor/Outdoor Commercial Worker (Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}S \times ED \times SA}{BW \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 1991 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}S \times ED \times SA}{BW \times ATnc}$ |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.12 | mg/cm²-event | USEPA, 2014 (USEPA, 2011; Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Construction Worker (Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}S \times ED \times SA}{BW \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 250 | days/year | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}S \times ED \times SA}{BW \times ATnc}$ |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn) | Where: DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.3 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; 95th percentile value for construction workers) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |

Table A3-1.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:

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Table A3-2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Hypothetical Resident (Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 24 | hours/day | USEPA, 2014 | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$ |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| Inhalation | Hypothetical Resident (Future) | Child | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (child) = |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 24 | hours/day | USEPA, 2014 | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for non-carcinogens (child) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$ |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| Inhalation | Hypothetical Resident (Future) | Lifetime | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}^{+}}{ED_{6-16} \times ADAF_{6-16}^{+} ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ET | Exposure Time | 24 | hours/day | USEPA, 2014 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Exposure concentration (µg/m³) for trichloroethene (lifetime) = |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[(ED_a + ED_c) \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}^{+}}{ED_{6-16} \times ADAF_{6-16}^{+} ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | $CA \times \left[\frac{EF \times (ED_a + ED_c) \times ET}{AT_c \times CF1} + 1\right]$ |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Where: |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |

Table A3-2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Recreator (Current/Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$ |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | |
| | | | | ET | Exposure Time | 3.6 | hours/day | USEPA, 2011 (Table 16-26; mean value (2173 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | Exposure concentration (µg/m³) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$ |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| Inhalation | On-Site Recreator (Current/Future) | Child | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$ |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | |
| | | | | ET | Exposure Time | 3.6 | hours/day | USEPA, 2011 (Table 16-26; mean value (2173 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | Exposure concentration (µg/m³) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$ |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| Inhalation | On-Site Recreator (Current/Future) | Lifetime | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | EF | Exposure Frequency | 195 | days/year | VDEQ, 2020 | |
| | | | | ET | Exposure Time | 3.6 | hours/day | USEPA, 2011 (Table 16-26; mean value (2173 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | Exposure concentration (µg/m³) for trichloroethene (lifetime) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[(ED_a + ED_c) \times CAF_l + MAF_l \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |

Table A3-2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Recreator (Current/Future) | Lifetime | Inhalation of Windblown Dust or Vapors in Outdoor Air | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | $CA \times \left[\frac{EF \times (ED_a + ED_c) \times ET}{AT_c \times CF1} + 1\right]$ |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | Where: |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| Inhalation | Trespasser (Current/Future) | Teen | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (teen) = |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | $\frac{CA \times EF \times ET \times ED6\text{-}16}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 3.6 | hours/day | USEPA, 2011 (Table 16-26; mean value (2173 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Exposure concentration (µg/m³) for noncarcinogens (teen) = |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times ED6\text{-}16}{CF1 \times ATnc}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for mutagenic carcinogens (teen) = |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[(ED_{6-16} \times ADAF_{6-16})\right]$ |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | |
| | | | | | | | | | Exposure concentration (µg/m³) for trichloroethene (teen) = |
| | | | | | | | | | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[ED_{6-16} \times CAF_i + MAF_i \times (ED_{6-16} \times ADAF_{6-16})\right]$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Inhalation | Outdoor Maintenace Worker (Current/Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 225 | days/year | USEPA, 2002 | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for noncarcinogens (adult) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |

Table A3-2.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Indoor/Outdoor Commercial Worker (Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 1991 | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for noncarcinogens (adult) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | | | | | | |
| Inhalation | Construction Worker (Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 250 | days/year | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | Exposure concentration (µg/m³) for noncarcinogens (adult) = |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | Where: |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | | | | | | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-3.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Adult | Ingestion of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CGW \times IRGWa \times EF \times FI\text{-}GW \times EDa}{BWa \times ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | IRGWa | Ingestion Rate, groundwater - adult | 2.5 | L/day | USEPA, 2014 (USEPA, 2011; Table 3-33; 90th percentile of consumer-only ingestion of drinking water (≥ 21 years)) | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{CGW \times IRGWa \times EF \times FI\text{-}GW \times EDa}{BWa \times ATnc,a}$ |
| | | | | FI-GW | Fraction Ingested from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | | | | | | |
| Ingestion | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Child | Ingestion of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = $\frac{CGW \times IRGWc \times EF \times FI\text{-}GW \times EDc}{BWc \times ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | IRGWc | Ingestion Rate, groundwater - child | 0.78 | L/day | USEPA, 2014 (USEPA, 2011; Tables 3-15 and 3-33; weighted average of 90th percentile consumer-only ingestion of drinking water (birth < 6 years)) | Daily Intake (mg/kg-day) for noncarcinogens (child) = $\frac{CGW \times IRGWc \times EF \times FI\text{-}GW \times EDc}{BWc \times ATnc,c}$ |
| | | | | FI-GW | Fraction Ingested from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | | | | | | |
| Ingestion | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Ingestion of Groundwater (Potable Use) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CGW \times FI\text{-}GW \times IFWMadj}{ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | FI-GW | Fraction Ingested from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | IFWMadj | Resident Mutagenic Drinking Water Ingestion Rate | 1019.9 | L/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFWMadj (L/kg) = $\frac{EF \times IR_c}{BW_c} \times \left[(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})\right] +$ $\frac{EF \times IR_a}{BW_a} \times \left[(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})\right]$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | IRGWc | Ingestion Rate, groundwater - child | 0.78 | L/day | USEPA, 2014 (USEPA, 2011; Tables 3-15 and 3-33; weighted average of 90th percentile consumer-only ingestion of drinking water (birth < 6 years)) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CGW \times (CAFo \times IFWadj + MAFo \times IFWMadj) \times FI\text{-}GW}{ATc}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Resident Drinking Water Ingestion Rate - Age Adjusted (L/kg) = $\frac{EF \times IR_c}{BW_c} \times (ED_{0-2} + ED_{2-6}) + \frac{EF \times IR_a}{BW_a} \times (ED_{6-16} + ED_{16-26})$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | IRGWa | Ingestion Rate, groundwater - adult | 2.5 | L/day | USEPA, 2014 (USEPA, 2011; Table 3-33; 90th percentile of consumer-only ingestion of drinking water (≥ 21 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = $CGW \times \left(\frac{IFW_{adj}}{AT_c} + \frac{IR\text{-}GW_c}{BW_c}\right)$ |
| | | | | IFWadj | Resident Drinking Water Ingestion Rate | 327.95 | L/kg | USEPA, 2005 | |
| | | | | | | | | | |

Table A3-3.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Construction Worker (Current/Future) | Adult | Ingestion of Groundwater (Trench Scenario) | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens = $\frac{CGW \times IRGW \times FI\text{-}GWt \times EF \times ED}{BW \times ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | IRGW | Ingestion Rate, groundwater | 0.028 | L/day | USEPA, 2019 | |
| | | | | FI-GWt | Fraction Ingested from Source, groundwater | 0.5 | unitless | Assume trench conditions are wet half of the time during construction (best professional judgment). | |
| | | | | EF | Exposure Frequency | 250 | days/year | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | Daily Intake (mg/kg-day) for noncarcinogens = $\frac{CGW \times IRGW \times FI\text{-}GWt \times EF \times ED}{BW \times ATnc}$ |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | | | | | | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Adult | Dermal Absorption of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDa \times SA\text{-}GWa}{BWa \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-GW | Fraction of Contact from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDa \times SA\text{-}GWa}{BWa \times ATnc,a}$ |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | SA-GWa | Skin Surface Area - groundwater, adult | 19652 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female adults, 21-78)) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | For organic compounds in which t-event,a ≤ t-star: |
| | | | | | | | | | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $2 \times FA \times Kp \times CGW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,a]/\pi}$ |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,a > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | $FA \times Kp \times CGW \times CF1 \times \{[t\text{-}event,a / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event,a | Event Duration, adult | 0.71 | hours/event | USEPA, 2014 (USEPA, 2011; Tables 16-30 and 16-31; weighted average of adult (21 to 78) 90th percentile of time spent bathing/showering in a day, divided by mean number of baths/showers taken in a day) | $Kp \times CGW \times CF1 \times t\text{-}event,a$ |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | | | | | | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Child | Dermal Absorption of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDc \times SA\text{-}GWc}{BWc \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-GW | Fraction of Contact from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDc \times SA\text{-}GWc}{BWc \times ATnc,c}$ |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | SA-GWc | Skin Surface Area - groundwater, child | 6365 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female children <6 years) | Where: |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | For organic compounds in which t-event,c ≤ t-star: |
| | | | | | | | | | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $2 \times FA \times Kp \times CGW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,c)/\pi]}$ |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,c > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | $FA \times Kp \times CGW \times CF1 \times \{[t\text{-}event,c / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |

Table A3-3.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Child | Dermal Absorption of Groundwater (Potable Use) | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event,c | Event Duration, child | 0.54 | hours/event | USEPA, 2014 (USEPA, 2011; Table 16-28; weighted average of 90th percentile time spent bathing (birth to < 6 years)) | Kp x CGW x CF1 x t-event,c |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | | | | | | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Dermal Absorption of Groundwater (Potable Use) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{\text{DA-event x DFWMres-adj}}{\text{ATc}}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | DFWMres-adj | Resident Mutagenic Water Dermal Contact Factor - Age Adjusted | 8191633 | cm²-event/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where: |
| | | | | $ET_{event\text{-}res\text{-}adj}$ | Resident Water Exposure Time - Age Adjusted | 0.6708 | hours/event | USEPA, 2005 | For organic compounds in which $ET_{event\text{-}res\text{-}adj} \leq$ t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | 2 x FA x Kp x CGW x CF1 x SQRT([6 x tau-event x $ET_{event\text{-}res\text{-}adj}$]/π) |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | For organic compounds in which $ET_{event\text{-}res\text{-}adj} >$ t-star: |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | FA x Kp x CGW x CF1 x {[$ET_{event\text{-}res\text{-}adj}$ / (1 + B)] + (2 x tau-event) x [(1 + 3B +3B²) / (1 + B)²]} |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | For inorganic compounds: |
| | | | | t-event,c | Event Duration, child | 0.54 | hours/event | USEPA, 2014 (USEPA, 2011; Table 16-28; weighted average of 90th percentile time spent bathing (birth to < 6 years)) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = Kp x CGW x CF1 x $ET_{event\text{-}res\text{-}adj}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Resident Water Exposure Time - Age Adjusted (hours/event) = $\frac{t_{-event,c} \times (ED_{0-2} + ED_{2-6}) + t_{-event,a} \times (ED_{6-16} + ED_{16-26})}{ED_{0-2} + ED_{2-6} + ED_{6-16} + ED_{16-26}}$ |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | t-event,a | Event Duration, adult | 0.71 | hours/event | USEPA, 2014 (USEPA, 2011; Tables 16-30 and 16-31; weighted average of adult (21 to 78) 90th percentile of time spent bathing/showering in a day, divided by mean number of baths/showers taken in a day) | Resident Mutagenic Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = $EV \times EF \times \left[\frac{SA_c}{BW_c} \times (ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}) + \frac{SA_a}{BW_a} \times (ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26})\right]$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Dermal Absorption of Groundwater (Potable Use) | SA-GWc | Skin Surface Area - groundwater, child | 6365 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female children <6 years) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = $\frac{DA_{event} \times [(CAF_o \times DFW_{res-adj}) + (MAF_o \times DFWM_{res-adj})]}{AT_c}$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | Resident Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = $EV \times EF \times \left(\frac{ED_c \times SA_c}{BW_c} + \frac{ED_a \times SA_a}{BW_a}\right)$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | SA-GWa | Skin Surface Area - groundwater, adult | 19652 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female adults, 21-78)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) = $DA_{event} \times \left(\frac{DFW_{res-adj}}{AT_c} + \frac{EV \times SA_c}{BW_c}\right)$ |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFWres-adj | Resident Water Dermal Contact Factor - Age Adjusted | 2610650 | cm²-event/kg | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | | | | | | |

Table A3-3.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Construction Worker (Current/Future) | Adult | Dermal Absorption of Groundwater (Trench Scenario) | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-GWt x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 250 | days/year | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = |
| | | | | FC-GWt | Fraction of Contact from Source, groundwater | 0.5 | unitless | Assume trench conditions are wet half of the time during construction (best professional judgment). | $\frac{\text{DA-event x EV x EF x FC-GWt x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | For organic compounds in which t-event ≤ t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) =<br>2 x FA x Kp x CGW x CF1 x SQRT[(6 x tau-event x t-event)/π] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | For organic compounds in which t-event > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) =<br>FA x Kp x CGW x CF1 x {[t-event / (1 + B)] + (2 x tau-event) x [(1 + 3B +3B²) / (1 + B)²]} |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) =<br>Kp x CGW x CF1 x t-event |
| | | | | t-event | Event Duration | 4 | hours/event | Site-specific assumption (Worker spends 4 hours/event in trench) | |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:

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Table A3-4.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Construction Worker (Future) | Adult | Inhalation of Groundwater Vapors in Trench Air | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATc \times CF1}$ |
| | | | | ET | Exposure Time | 4 | hours/day | VURAM, 2020; trench model default | |
| | | | | EF | Exposure Frequency | 125 | days/year | VURAM, 2020; trench model default | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATnc \times CF1}$ |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where: |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | $CA\ (\mu g/m^3) = (CGW \times VFw,trench) \times CF2$ |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | VFw,trench | Volatilization Factor, water-to-trench air | Calculated | L/m³ | VURAM, 2020 | |
| Inhalation | Outdoor Worker (Current/Future) | Adult | Inhalation of Groundwater Vapors in Outdoor Air | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) = |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATc \times CF1}$ |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | Exposure Point Concentration, air (µg/m³) = |
| | | | | EF | Exposure Frequency | 225 | days/year | USEPA, 2002 | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATnc \times CF1}$ |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $CA\ (\mu g/m^3) = (CGW \times VFw,amb) \times CF2$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | VFw,amb | Volatilization Factor, water-to-ambient air | Calculated | (mg/m³)-air/(mg/L)-water | ASTM, 2015 (Equations in Attachment A4) | |
| Inhalation | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Adult | Inhalation of Groundwater Vapors in Indoor Air (Showering) | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | CA | Exposure Point Concentration, shower air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ETs \times EV \times EF \times FH\text{-}GW \times EDa}{ATc \times CF1}$ |
| | | | | ETs | Exposure Time, shower | 0.33 | hours/event | See equations | |
| | | | | EV | Event Frequency | 1 | event/day | | |
| | | | | Ds | Shower Duration | 0.71 | hour/event | USEPA, 2014 | |
| | | | | Ra | Air Exchange Rate | 0.0167 | 1/hr | Foster and Chrostowski, 1987 | Exposure concentration (µg/m³) for non-carcinogens (lifetime) = |
| | | | | ts,a | Total Time in Shower Room | 1 | hour | USEPA, 2011; Table 16-29, 95th percentile value of 60 min (1 hour) for 16 to <21 years, total time spent in bathroom for shower and remaining in enclosed bathroom. | $\frac{CA \times ETs \times EV \times EF \times FH\text{-}GW \times EDa}{ATnc,a \times CF1}$ |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | Where: |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure Time, shower (hr/event) = |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | $\left[Ds + \frac{e^{(-Ra \times ts)}}{Ra} - \frac{e^{(Ra \times (Ds - ts))}}{Ra}\right]$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Note: It is assumed that the child resident does not take showers; however, early life exposure via bathing is taken into account with the mutagenic calculations. |
| | | | | | | | | | |

Table A3-4.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Inhalation of Groundwater Vapors in Indoor Air (Bathing/Shower) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = |
| | | | | CA | Exposure Point Concentration, shower air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times EF \times EV \times ETs\text{-}adj}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Exposure concentration (µg/m³) for trichloroethene (lifetime) = |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CA \times EF \times EV \times ETs\text{-}adj}{AT_c \times CF1} \times \left[ED_r \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | $CA \times \left[\frac{EF \times ED_r \times EV \times ETs\text{-}adj}{AT_c \times CF1} + 1\right]$ |
| | | | | EDr | Exposure Duration, lifetime | 26 | years | USEPA, 2014 (USEPA, 2011; Table 16-108; 90th percentile for current residence time) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | Where: |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | Exposure Time, shower - age adjusted (hr/event) = |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | |
| | | | | CF2 | Conversion Factor 2 | 0.0167 | hr/min | - | $\left[Ds + \frac{e^{(-Ra \times ts\text{-}adj)}}{Ra} - \frac{e^{(Ra \times (Ds - ts\text{-}adj))}}{Ra}\right]$ |
| | | | | ETs-adj | Exposure Time, shower - age adjusted | 0.31 | hours/event | See equations | |
| | | | | Ds-adj | Shower Duration | 0.625 | hours/event | USEPA, 2014; average of child and adult resident water exposure times of 0.54 hours/event and 0.71 hours/event | Total Time in Shower Room - age adjusted (hour) |
| | | | | Ra | Air Exchange Rate | 0.0167 | 1/hr | Foster and Chrostowski, 1987 | |
| | | | | ts-adj | Total Time in Shower Room - age adjusted | 1 | hour | See equations | $\frac{ts\text{-}c \times (ED_{0-2} + ED_{2-6}) + ts\text{-}a \times (ED_{6-16} + ED_{16-26})}{ED_{0-2} + ED_{2-6} + ED_{6-16} + ED_{16-26}}$ |
| | | | | ts-c | Total Time in Bathroom - child | 1 | hour | USEPA, 2011; Table 16-29, 95th percentile value of 60 min (1 hour) for 3 to < 6 years old, total time spent taking a bath and remaining in enclosed bathroom. | |
| | | | | ts-a | Total Time in Bathroom - adult | 1 | hour | USEPA, 2011; Table 16-29, 95th percentile value of 60 min (1 hour) for 16 to <21 years, total time spent in bathroom for shower and remaining in enclosed bathroom. | |
| Inhalation | On-Site Hypothetical Resident (Future) | Adult | Inhalation of Groundwater Vapors in Indoor Air (Vapor Intrusion) | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times EDa}{ATc \times CF1}$ |
| | | | | ET | Exposure Time | 24 | hours/day | USEPA, 2014 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times EDa}{ATnc,a \times CF1}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |

Table A3-4.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Hypothetical Resident (Future) | Child | Inhalation of Groundwater Vapors in Indoor Air (Vapor Intrusion) | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (child) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times EDc}{ATc \times CF1}$ |
| | | | | ET | Exposure Time | 24 | hours/day | USEPA, 2014 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure concentration (µg/m³) for non-carcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times EDc}{ATnc,c \times CF1}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| Inhalation | On-Site Hypothetical Resident (Future) | Lifetime | Inhalation of Groundwater Vapors in Indoor Air (Vapor Intrusion) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | ET | Exposure Time | 24 | hours/day | USEPA, 2014 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Exposure concentration (µg/m³) for trichloroethene (lifetime) = |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[ED_r \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | $CA \times \left[\frac{EF \times ED_r \times ET}{AT_c \times CF1} + 1\right]$ |
| | | | | EDr | Exposure Duration, lifetime | 26 | years | USEPA, 2014 (USEPA, 2011; Table 16-108; 90th percentile for current residence time) | |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | |

Table A3-4.RME
Values Used for Daily Intake Calculations
Reasonable Maximum Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Indoor/Outdoor Commercial Worker (Future) | Adult | Inhalation of Groundwater Vapors in Indoor Air (Vapor Intrusion) and Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | CA x ET x EF x FH-GW x ED |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | ATc x CF1 |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 1991 | CA x ET x EF x FH-GW x ED |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | ATnc x CF1 |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Where: |
| | | | | VFw,amb | Volatilization Factor, water-to-ambient air | Calculated | mg/m³)-air/(mg/L)-wate | ASTM, 2015 (Equations in Attachment A4) | CA (µg/m³) For Outdoor Air = (CGW x VFw,amb) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | CA (µg/m³) For Indoor Air = Modeled |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:


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Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSWa \times EF \times FI\text{-}SW \times EDa}{BWa \times ATc}$ |
| | | | | IRSWa | Ingestion Rate, surface water - adult | 0.0985 | L/day | USEPA, 2019; Time weighted average calculated based on the upper percentile values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSW \times IRSWa \times EF \times FI\text{-}SW \times EDa}{BWa \times ATnc,a}$ |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| Ingestion | Recreator (Future) | Child | Ingestion of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSWc \times EF \times FI\text{-}SW \times EDc}{BWc \times ATc}$ |
| | | | | IRSWc | Ingestion Rate, surface water - child | 0.12 | L/day | USEPA, 2019; Table 3.5, 95th Percentile value of 1 to <2 years, of EFH 2019 | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSW \times IRSWc \times EF \times FI\text{-}SW \times EDc}{BWc \times ATnc,c}$ |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Surface Water | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times FI\text{-}SW \times IFWMadj}{ATc}$ |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | IFWMadj | Resident Mutagenic Drinking Water Ingestion Rate | 23 | L/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFWMadj (L/kg) = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | $\frac{EF \times IR_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | $\frac{EF \times IR_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | IRSWc | Ingestion Rate, surface water - child | 0.12 | L/day | USEPA, 2019; Table 3.5, 95th Percentile value of 1 to <2 years, of EFH 2019 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | $\frac{CSW \times (CAFo \times IFWadj + MAFo \times IFWMadj) \times FI\text{-}SW}{ATc}$ |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Resident Drinking Water Ingestion Rate - Age Adjusted (L/kg) = |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | $\frac{EF \times IR_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times IR_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | IRSWa | Ingestion Rate, surface water - adult | 0.0985 | L/day | USEPA, 2019; Time weighted average calculated based on the upper percentile values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | IFWadj | Resident Drinking Water Ingestion Rate | 5.45 | L/kg | USEPA, 2005 | $CGW \times \left(\frac{IFW_{adj}}{AT_c} + \frac{IR\text{-}GW_c}{BW_c}\right)$ |

Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Trespasser (Future) | Teen | Ingestion of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSW \times EF \times FI\text{-}SW \times ED6\text{-}16}{BW6\text{-}16 \times ATc}$ |
| | | | | IRSW | Ingestion Rate, surface water | 0.0985 | L/day | USEPA, 2019; Time weighted average calculated based on the upper percentile values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSW \times IRSW \times EF \times FI\text{-}SW \times ED6\text{-}16}{BW6\text{-}16 \times ATnc}$ |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | | | | | | |
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Surface Water | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times FI\text{-}SW \times IFWMadj}{ATc}$ |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | IFWMadj | Resident Mutagenic Drinking Water Ingestion Rate | 2.03 | L/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFWMadj (L/kg) = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | $\frac{EF \times IRSW}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | |
| | | | | IRSW | Ingestion Rate, surface water, teen | 0.124 | L/day | Time weighted average calculated based on the upper percentile values for 6 to <11 years and 11 to <16 years, from Table 3.7 of EFH 2019 | Daily Intake (mg/kg-day) for trichloroethene (teen) = |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | $\frac{CSW \times (CAFo \times IFWadj + MAFo \times IFWMadj) \times FI\text{-}SW}{ATc}$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Surface Water Ingestion Rate - Age Adjusted (L/kg) = |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | $\frac{EF \times IRSW}{BW_{6-16}} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | |
| | | | | IFWadj | Water Ingestion Rate - Age-adjusted | 0.676 | L/kg | See equations | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| | | | | | | | | | |
| | | | | | | | | | |
| Ingestion | Construction Worker (Current/Future) | Adult | Ingestion of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATc}$ |
| | | | | IRSW | Ingestion Rate, surface water | 0.0985 | L/day | USEPA, 2019; Time weighted average calculated based on the upper percentile values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 30 | days/year | Receptor spends one month re-directing current drainage network to support construction activities | Daily Intake (mg/kg-day) for noncarcinogens = |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATnc}$ |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | | | | | | |

Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Outdoor Maintenance Worker (Current/Future) | Adult | Ingestion of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATc}$ |
| | | | | IRSW | Ingestion Rate, surface water | 0.0985 | L/day | USEPA, 2019; Time weighted average calculated based on the upper percentile values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency, water | 113 | days/year | Assume that half of the time spent outdoors is in wet conditions (i.e., 225 days/year divided in half) | Daily Intake (mg/kg-day) for noncarcinogens = |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATnc}$ |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| Dermal Absorption | Recreator (Future) | Adult | Dermal Absorption of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA\text{-}SWa}{BWa \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA\text{-}SWa}{BWa \times ATnc,a}$ |
| | | | | SA-SWa | Skin Surface Area - surface water, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | For organic compounds in which t-event,a ≤ t-star: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,a]/\pi}$ |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,a > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[t\text{-}event,a / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event,a | Event Duration, adult | 2 | hours/event | VDEQ, 2020 ( Assume exposure time of 2 hours per event; similar to recreator scenario in VDEQ VURAM guidance) | $Kp \times CSW \times CF1 \times t\text{-}event,a$ |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| Dermal Absorption | Recreator (Future) | Child | Dermal Absorption of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDc \times SA\text{-}SWc}{BWc \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDc \times SA\text{-}SWc}{BWc \times ATnc,c}$ |
| | | | | SA-SWc | Skin Surface Area - surface water, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Where: |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | For organic compounds in which t-event,c ≤ t-star: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,c)/\pi]}$ |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,c > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[t\text{-}event,c / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |

Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Future) | Child | Dermal Absorption of Surface Water | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = Kp x CSW x CF1 x t-event,c |
| | | | | t-event,c | Event Duration, child | 2 | hours/event | VDEQ, 2020 ( Assume exposure time of 2 hours per event; similar to recreator scenario in VDEQ VURAM guidance) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Lifetime | Dermal Absorption of Surface Water | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{\text{DA-event x DFWMadj}}{\text{ATc}}$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | SA-SWa | Skin Surface Area - surface water, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Dermally Absorbed Dose (mg/kg-day) for Trichloroethene (lifetime) = $\frac{DA_{event} \times \left[\left(CAF_0 \times DFW_{res-adj}\right) + \left(MAF_0 \times DFWM_{res-adj}\right)\right]}{AT_c}$ |
| | | | | SA-SWc | Skin Surface Area - surface water, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Dermally Absorbed Dose (mg/kg-day) for Vinyl Chloride (lifetime) = $DA_{event} \times \left(\frac{DFW_{res-adj}}{AT_c} + \frac{EV \times SA\text{-}SW_c}{BW_c}\right)$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | Where: For organic compounds in which $ET_{event-res-adj} \leq$ t-star: DA-event (Absorbed Dose per Event [mg/cm²-event]) = $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[6 \times \text{tau-event} \times ET_{event-res-adj}]/\pi}$ |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | For organic compounds in which $ET_{event-res-adj} >$ t-star: |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | $FA \times Kp \times CSW \times CF1 \times \{[ET_{event-res-adj} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | Resident Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $EV \times EF \times \left(\frac{ED_c \times SA\text{-}SW_c}{BW_c} + \frac{ED_a \times SA\text{-}SW_a}{BW_a}\right)$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | |

Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Future) | Lifetime | Dermal Absorption of Surface Water | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | Recreator Mutagenic Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | t-event,a | Event Duration, adult | 2 | hours/event | VDEQ, 2020 ( Assume exposure time of 2 hours per event; similar to recreator scenario in VDEQ VURAM guidance) | $EV \times EF \times \left[ \frac{SA\text{-}SW_c}{BW_c} \times (ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}) + \frac{SA\text{-}SW_a}{BW_a} \times (ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}) \right]$ |
| | | | | t-event,c | Event Duration, child | 2 | hours/event | VDEQ, 2020 ( Assume exposure time of 2 hours per event; similar to recreator scenario in VDEQ VURAM guidance) | Recreator Water Exposure Time - Age Adjusted (hours/event) = |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | $\frac{t\text{-}event,c \times (ED_{0-2} + ED_{2-6}) + t\text{-}event,a \times (ED_{6-16} + ED_{16-26})}{ED_{0-2} + ED_{2-6} + ED_{6-16} + ED_{16-26}}$ |
| | | | | ETeventadj | Water Exposure Time - Age Adjusted | 2 | hours/event | USEPA, 2005 | |
| | | | | DFWadj | Dermal water contact factor- age-adjusted | 209284 | cm²-event/kg | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | DFWMadj | Mutagenic water dermal contact factor- age-adjusted | 658368 | cm²-event/kg | USEPA, 2005 | [DAD for mutagens (adult) + DAD for mutagens (child)] |
| | | | | | | | | | |
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (teen) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA6\text{-}16}{BW6\text{-}16 \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet | |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (teen) = |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA6\text{-}16}{BW6\text{-}16 \times Atnc}$ |
| | | | | SA6-16 | Skin Surface Area | 4639 | cm² | USEPA 2011 (Tables 7-2; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 6 to <16 years)) | Where: |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | For organic compounds in which t-event,t ≤ t-star: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Atnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,t]/\pi}$ |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,t > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[t\text{-}event,t / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event,t | Event Duration, teen | 2 | hours/event | VDEQ, 2020 ( Assume exposure time of 2 hours per event; similar to recreator scenario in VDEQ VURAM guidance) | $Kp \times CSW \times CF1 \times t\text{-}event,t$ |
| | | | | | | | | | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (teen) = |
| | | | | | | | | | $\frac{DA\text{-}event \times FC\text{-}SW \times DFWMadj}{ATc}$ |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for Trichloroethene (lifetime) = |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | $\frac{DA_{event} \times FC\text{-}SW \times \left[ (CAF_o \times DFW_{adj}) + (MAF_o \times DFWM_{adj}) \right]}{AT_c}$ |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | DFWadj | Dermal water contact factor- age-adjusted | 25304 | cm²-event/kg | See equations | |
| | | | | DFWMadj | Mutagenic water dermal contact factor- age-adjusted | 75911 | cm²-event/kg | See equations | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| | | | | | | | | | Receptor Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | | | | | | $EV \times EF \times \left( \frac{ED_{6-16} \times SA_{6-16}}{BW_{6-16}} \right)$ |
| | | | | | | | | | Receptor Mutagenic Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | | | | | | $EV \times EF \times \left[ \frac{SA_{6-16}}{BW_{6-16}} \times (ED_{6-16} \times ADAF_{6-16}) \right]$ |

Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Outdoor Maintenance Worker (Current/Future) | Adult | Dermal Absorption of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 113 | days/year | Assume that half of the time spent outdoors is in wet conditions (i.e., 225 days/year divided in half) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where:<br>For organic compounds in which t-event ≤ t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[(6 \times \text{tau-event} \times \text{t-event})/\pi]}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | For organic compounds in which t-event > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[\text{t-event} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event | Event Duration | 4 | hours/event | Site-specific assumption (Worker spends 4 hours/event in trench) | $Kp \times CSW \times CF1 \times \text{t-event}$ |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |

Table A3-5.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Construction Worker (Current/Future) | Adult | Dermal Absorption of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 30 | days/year | Receptor spends one month re-directing current drainage network to support construction activities | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | ED | Exposure Duration | 1 | years | Site-specific assumption (1-year construction project (50 weeks x 5 days/week x 1 year)) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn) | Where:<br>For organic compounds in which t-event ≤ t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{\frac{6 \times \text{tau-event} \times \text{t-event}}{\pi}}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 365 | days | USEPA, 1989 (ED x 365 days/year) | For organic compounds in which t-event > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[\text{t-event} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event | Event Duration | 4 | hours/event | Site-specific assumption (Worker spends 4 hours/event in trench) | Kp x CSW x CF1 x t-event |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:


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Table A3-6.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Consumption of Fish Tissue Modeled from Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Fish | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | Cfish | Exposure Point Concentration, fish tissue | Site-Specific | mg/kg-fish tissue | - | Cfish x CRFa x CF7 x EF-F x FI-F x EDa / BWa x ATc |
| | | | | CRFa | Consumption Rate of Fish, adult | 17.5 | g/day | ODEQ, 2007 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-F | Fraction Ingested, Fish | 0.25 | unitless | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Cfish x CRFa x CF7 x EF-F x FI-F x EDa / BWa x ATnc,a |
| | | | | EF-F | Exposure Frequency, Fishing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | Where: |
| | | | | BCFish | Bioconcentration factor for fish | Chemical-specific | L/kg | DOE, 2020 | Cfish (mg/kg) = CSW x BCFish (log Kow is < 4.0) |
| | | | | BAFish | Bioaccumulation factor for fish | Chemical-specific | L/kg | See Attachment A4 for chemical-specific parameters. | Cfish (mg/kg) = CSW x BAFish (log Kow is > 4.0) |
| | | | | log Kow | log octanol-water partition coefficient | Chemical-specific | unitless | USEPA, 2020 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | | | | | | |
| Ingestion | Recreator (Future) | Child | Ingestion of Fish | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | Cfish | Exposure Point Concentration, fish tissue | Site-Specific | mg/kg-fish tissue | - | Cfish x CRFc x CF7 x EF-F x FI-F x EDc / BWc x ATc |
| | | | | CRFc | Consumption Rate of Fish, child | 8.8 | g/day | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages 3 to <6 years | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-F | Fraction Ingested, Fish | 0.25 | unitless | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Cfish x CRFc CF7 x EF-F x FI-F x EDc / BWc x ATnc,c |
| | | | | EF-F | Exposure Frequency, Fishing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | Where: |
| | | | | BCFish | Bioconcentration factor for fish | Chemical-specific | L/kg | DOE, 2020 | Cfish (mg/kg- fish tissue) = CSW x BCFish (log Kow is < 4.0) |
| | | | | BAFish | Bioaccumulation factor for fish | Chemical-specific | L/kg | See Attachment A4 for chemical-specific parameters. | Cfish (mg/kg-fish tissue) = CSW x BAFish (log Kow is > 4.0) |
| | | | | log Kow | log octanol-water partition coefficient | Chemical-specific | unitless | USEPA, 2020 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Fish | | | | | | Mutagenic Constituents and Equations |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CFish | Exposure Point Concentration, fish tissue | Site-Specific | mg/kg-fish tissue | - | $\frac{\text{CFish x FI-F x CRFMadj x CF7}}{\text{ATc}}$ |
| | | | | FI-F | Fraction Ingested, Fish | 0.25 | unitless | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | |
| | | | | CRFMadj | Mutgenic consumption rate of fish - Age Adjusted | 10046 | g/kg | Calculated; See equations | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where CRFMadj (g/kg) = |
| | | | | EF-F | Exposure Frequency, Fishing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | $\frac{CRF_c \, x \, EF - F}{BW_c} \times \left[ \left( ED_{0-2} \times ADAF_{0-2} \right) + \left( ED_{2-6} \times ADAF_{2-6} \right) \right] +$ |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | |
| | | | | CRFc | Consumption Rate of Fish, child | 8.8 | g/day | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages 3 to <6 years | |
| | | | | CRFa | Consumption Rate of Fish, adult | 17.5 | g/day | ODEQ, 2007 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | $\frac{CRF_a \, x \, EF - F}{BW_a} \times \left[ \left( ED_{6-16} \times ADAF_{6-16} \right) + \left( ED_{16-26} \times ADAF_{16-26} \right) \right]$ |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | TCE and vinyl chloride are not bioaccumulative compounds and will not be evaluated for this food pathway. |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | | | | | | |

Notes:

- Not applicaple

(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-7.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | CSD x IRSDa x RBA x EF x FI-SD x EDa x CF1 / BWa x ATc |
| | | | | IRSDa | Ingestion Rate, sediment- adult | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | CSD x IRSDa x RBA x EF x FI-SD x EDa x CF1 / BWa x ATnc,a |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Recreator (Future) | Child | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | CSD x IRSDc x RBA x EF x FI-SD x EDc x CF1 / BWc x ATc |
| | | | | IRSDc | Ingestion Rate, sediment - child | 200 | mg/day | USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | CSD x IRSDc x RBA x EF x FI-SD x EDc x CF1 / BWc x ATnc,c |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Sediment | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | CSD x RBA x FI-SD x CF1 x IFSMadj / ATc |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where IFSMadj (mg/kg) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | $\frac{EF \times IRSD_c}{BW_c} \times [(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})] +$ |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 35750 | mg/kg | See equations | $\frac{EF \times IRSD_a}{BW_a} \times [(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})]$ |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | IRSDa | Ingestion Rate, sediment- adult | 100 | mg/day | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | IRSDc | Ingestion Rate, sediment - child | 200 | mg/day | USEPA, 2014 (USEPA, 2011; Table 5-1; "upper-bound values" accounting for both soil and dust ingestion) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | CSD x RBA x FI-SD x CF1 x (CAFo x IFSadj + MAFo x IFSMadj) / ATc |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | $\frac{EF \times IRSD_c}{BW_c} \times (ED_{0-2} + ED_{2-6}) + \frac{EF \times IRSD_a}{BW_a} \times (ED_{6-16} + ED_{16-26})$ |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | $CSD \times \left( \frac{IFS_{adj} \times RBA \times CF1 \times FI}{AT_c} + \frac{IR\text{-}S_c \times RBA \times CF1 \times FI}{BW_c} \right)$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 7875 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |

Table A3-7.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (teen) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATc}$ |
| | | | | IRSD | Ingestion Rate, sediment | 100 | mg/day | USEPA, 2011 (Table ES-1; general population central tendency value (soil + dust) for 6 to < 21 years) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (teen) = $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATnc}$ |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for mutagenic carcinogens (teen) = |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | $\frac{CSD \times RBA \times FI\text{-}SD \times CF1 \times IFSMadj}{ATc}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFSMadj (mg/kg) = $\frac{EF \times IRSD}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 1636 | mg/kg | See equations | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 545 | mg/kg | See equations | Daily Intake (mg/kg-day) for trichloroethene (teen) = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | $\frac{CSD \times RBA \times FI\text{-}SD \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | Where IFSadj (mg/kg) = $\frac{EF \times IRSD}{BW_{6-16}} \times \left(ED_{6-16}\right)$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Ingestion | Outdoor Maintenace Worker (Current/Future) | Adult | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED \times CF1}{BW \times ATc}$ |
| | | | | IRSD | Ingestion Rate, sediment | 100 | mg/day | USEPA, 2014 (USEPA, 1991; p 15) | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED \times CF1}{BW \times ATnc}$ |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 225 | days/year | USEPA, 2002 | |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Dermal Absorption | Recreator (Future) | Adult | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times EDa \times SAa}{BWa \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times EDa \times SAa}{BWa \times ATnc,a}$ |
| | | | | SAa | Skin Surface Area, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | $CSD \times CF1 \times AFa \times ABS$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.07 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |

Table A3-7.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Future) | Child | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times EDc \times SAc}{BWc \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times EDc \times SAc}{BWc \times ATnc,c}$ |
| | | | | SAc | Skin Surface Area, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | CSD x CF1 x AFc x ABS |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.2 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario) | [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Lifetime | Dermal Absorption of Sediment | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{CSD \times ABS \times FC\text{-}SD \times CF1 \times DFSMadj}{ATc}$ |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where DFSMadj (mg/kg) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | $\frac{EF \times EV \times AF_c \times SA_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right]$ |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 95964 | mg/kg | See equations | $\frac{EF \times EV \times AF_a \times SA_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | EF | Exposure Frequency, water | 98 | days/year | VDEQ, 2020 (Receptor spends half of the time in wet conditions (i.e., 195 days/year divided in half)) | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.2 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended child value for RME scenario) | |
| | | | | SAc | Skin Surface Area, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CSD \times ABS \times FC\text{-}SD \times CF1 \times (CAFd \times DFSadj + MAFd \times DFSMadj)}{ATc}$ |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Where DFSadj (mg/kg) = |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.07 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; recommended adult value for RME scenario) | $\frac{EF \times EV \times AF_c \times SA_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times EV \times AF_a \times SA_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | SAa | Skin Surface Area, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | $CSD \times \left(\frac{DFS_{adj} \times ABS \times CF1}{AT_c} + \frac{SA_c \times ABS \times CF1 \times EV \times AF_c}{BW_c}\right)$ |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CAFd | Cancer Adjustment Factor, dermal | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 24002 | mg/kg | See equations | |
| | | | | MAFd | Mutagenic Adjustment Factor, dermal | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |

Table A3-7.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (teen) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-SD x ED6-16 x SA6-16}}{\text{BW6-16 x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (teen) = |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{\text{DA-event x EV x EF x FC-SD x ED6-16 x SA6-16}}{\text{BW6-16 x ATnc}}$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | SA6-16 | Skin Surface Area | 4639 | cm² | USEPA 2011 (Tables 7-2; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 6 to <16 years)) | Where: |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\text{CSD x CF1 x AF x ABS}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (teen) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{\text{CSD x FC-SD x ABS x CF1 x DFSMadj}}{\text{ATc}}$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.04 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for soccer player #1 (teens, moist conditions)) | Where DFSMadj (mg/kg) = |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 5314 | mg/kg | See equations | $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 1771 | mg/kg | See equations | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | | | | | | $\frac{\text{CSD x FC-SD x ABS x CF1 x (CAFo x DFSadj + MAFo x DFSMadj)}}{\text{ATc}}$ |
| | | | | | | | | | Where DFSadj (mg/kg) = |
| | | | | | | | | | $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times \left(ED_{6-16}\right)$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |

Table A3-7.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Outdoor Maintenace Worker (Current/Future) | Adult | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times ED \times SA}{BW \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 225 | days/year | USEPA, 2002 | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | ED | Exposure Duration | 25 | years | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times ED \times SA}{BW \times ATnc}$ |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Where: DA-event (Absorbed Dose per Event [mg/cm²-event]) = CSD x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 9125 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.12 | mg/cm²-event | USEPA, 2014 (USEPA, 2011; Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-8.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Consumption of Crab Tissue Modeled from Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Crab | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | Ccrab | Exposure Point Concentration, crab tissue | Site-Specific | mg/kg-crab tissue | - | $\frac{Ccrab \times CRCa \times EF\text{-}C \times EDa \times CF7 \times FI\text{-}C}{BWa \times ATc}$ |
| | | | | CRCa | Consumption Rate of Crab, adult | 17.5 | g/day | ODEQ, 2007 | |
| | | | | EF-C | Exposure Frequency, Crabbing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-C | Fraction Ingested, Crabs | 0.25 | unitless | Assumed that the recreator eats crabs year round, but only a quarter of it is wild caught. | $\frac{Ccrab \times CRCa \times EF\text{-}C \times EDa \times CF7 \times FI\text{-}C}{BWa \times ATnc,a}$ |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | Where: |
| | | | | EDa | Exposure Duration, adult | 20 | years | USEPA, 2014 (EDr (26 years) - EDc (6 years)) | Ccrab (mg/kg-crab tissue) = (CSD/foc) x BSAF x CL |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 7300 | days | USEPA, 1989 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | foc | Fraction of organic carbon in sediment | 0.01 | unitless | ODEQ, 2007 | |
| | | | | BSAF | Biota-to-sediment accumulation factor | Chemical-specific | unitless | See Attachment A4 for chemical-specific parameters. | |
| | | | | CL | Lipid content | 0.03 | unitless | ODEQ, 2007 | |
| Ingestion | Recreator (Future) | Child | Ingestion of Crab | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | Ccrab | Exposure Point Concentration, crab tissue | Site-Specific | mg/kg-crab tissue | - | $\frac{Ccrab \times CRCc \times EF\text{-}C \times EDc \times CF7 \times FI\text{-}C}{BWc \times ATc}$ |
| | | | | CRCc | Consumption Rate of Crab, child | 8.8 | g/day | USEPA, 2011 (Table 10-3; 95th percentile value for recreational marine fish intake for Atlantic, ages 3 to <6 years | |
| | | | | EF-C | Exposure Frequency, Crabbing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-C | Fraction Ingested, Crabs | 0.25 | unitless | Assumed that the recreator eats crabs year round, but only a quarter of it is wild caught. | $\frac{Ccrab \times CRCc \times EF\text{-}C \times EDc \times CF7 \times FI\text{-}C}{BWc \times ATnc,c}$ |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | Where: |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Ccrab (mg/kg-crab tissue) = (CSD/foc) x BSAF x CL |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | foc | Fraction of organic carbon in sediment | 0.01 | unitless | ODEQ, 2007 | |
| | | | | BSAF | Biota-to-sediment accumulation factor | Chemical-specific | unitless | See Attachment A4 for chemical-specific parameters. | |
| | | | | CL | Lipid content | 0.03 | unitless | ODEQ, 2007 | |

Table A3-8.RME
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Reasonable Maximum Exposure: Consumption of Crab Tissue Modeled from Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Crab | | | | | | Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | Ccrab | Exposure Point Concentration, crab tissue | Site-Specific | mg/kg-crab tissue | - | Ccrab x FI-C x CF7 x CRCMadj / ATc |
| | | | | FI-C | Fraction Ingested, Crabs | 0.25 | unitless | Assumed that the recreator eats crabs year round, but only a quarter of it is wild caught. | |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | Where CRCMadj (mg/kg) = |
| | | | | CRCMadj | Mutgenic consumption rate of crab - Age Adjusted | 10046 | g/kg | Calculated; See equations | $\frac{CRC_c \times EF - C}{BW_c} \times [(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})] +$ |
| | | | | CRCc | Consumption Rate of Crab, child | 8.8 | g/day | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages 3 to <6 years | $\frac{CRC_a \times EF - C}{BW_a} \times [(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})]$ |
| | | | | CRCa | Consumption Rate of Crab, adult | 17.5 | g/day | ODEQ, 2007 | |
| | | | | EF-C | Exposure Frequency, Crabbing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Where: |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Ccrab (mg/kg-crab tissue) = (CSD/foc) x BSAF x CL |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | TCE and vinyl chloride are not bioaccumulative compounds and will not be evaluated for this food pathway. |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | foc | Fraction of organic carbon in sediment | 0.01 | unitless | ODEQ, 2007 | |
| | | | | BSAF | Biota-to-sediment accumulation factor | Chemical-specific | unitless | See Attachment A4 for chemical-specific parameters. | |
| | | | | CL | Lipid content | 0.03 | unitless | ODEQ, 2007 | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:


Oregon Department of Environmental Quality, 2007. Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment. Oregon Department of Environmental Quality Environmental Cleanup Program. Updated April 3, 2007.

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U.S. Environmental Protection Agency (USEPA), 1991. Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors. Office of Emergency and Remedial Response, Washington, DC. March.

U.S. Environmental Protection Agency (USEPA), 2002. Supplemental Guidance for Development of Soil Screening Levels for Superfund Sites, Office of Emergency and Remedial Response, OSWER Directive 9355.4-24. December 2002.

U.S. Environmental Protection Agency (USEPA), 2004. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, July 2004.

U.S. Environmental Protection Agency (USEPA), 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. Risk Assessment Forum, EPA, Washington, DC. 20460, EPA/630/R-03/003F. March.

U.S. Environmental Protection Agency (USEPA), 2007. Guidance for Evaluating the Oral Bioavailability of Metals in Soils for Use in Human Health Risk Assessment. U.S.Environmental Protection Agency, Office of Solid Waste and Emergency Response:Washington, DC. OSWER 9285.7-80.

U.S. Environmental Protection Agency (USEPA), 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September 2011.

U.S. Environmental Protection Agency (USEPA), 2014. Human Health Evaluation Manual. Supplemental Guidance: Update of Standard Default Exposure Factors. Office of Superfund Remediation and Technology Innovation. OSWER Directive 9200.1-120. February 6. Amended September 2015.

**Table A3-9.RME**
**Values Used for Skin Surface Areas Calculations**
**Reasonable Maximum Exposure: Trespasser, Recreator and Hypothetical Resident Scenarios**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Age Group | Mean Surface Area by Body Part [9] (USEPA, 2011; Table 7-2, Page 7-6) | | | | | | | Receptor Age Range (Years): 6 | Child Recreator and Resident | 10 | Teen Trespasser | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Head $cm^2$ | Arms $cm^2$ | Forearms $cm^2$ | Hands $cm^2$ | Legs $cm^2$ | Lower Legs $cm^2$ | Feet $cm^2$ | Time-Weight Factor [1] (%) | Surface Water and Sediment [3] 0-6 years | Time-Weight Factor [1] (%) | Soil [2] 6-16 years | Surface Water and Sediment [3] 6-16 years |
| Birth to 1 month | 530 | 400 | 180 | 150 | 600 | 240 | 190 | 0.01 | 18 | - | - | - |
| 1 to <3 months | 600 | 450 | 202.5 | 170 | 680 | 272 | 210 | 0.03 | 40 | - | - | - |
| 3 to <6 months | 690 | 520 | 234 | 200 | 780 | 312 | 250 | 0.04 | 67 | - | - | - |
| 6 to <12 months | 820 | 620 | 279 | 240 | 930 | 372 | 290 | 0.08 | 167 | - | - | - |
| 1 to <2 years | 870 | 690 | 310.5 | 300 | 1220 | 488 | 330 | 0.17 | 383 | - | - | - |
| 2 to <3 years | 510 | 880 | 396 | 280 | 1540 | 616 | 380 | 0.17 | 364 | - | - | - |
| 3 to <6 years | 600 | 1060 | 477 | 370 | 1950 | 780 | 490 | 0.5 | 1359 | - | - | - |
| 6 to <11 years | 660 | 1510 | 680 | 510 | 3110 | 1244 | 730 | - | - | 0.50 | 1547 | 1912 |
| 11 to <16 years | 730 | 2270 | 1022 | 720 | 4830 | 1932 | 1050 | - | - | 0.50 | 2202 | 2727 |
| 16 to <21 years | 760 | 2690 | 1211 | 830 | 5430 | 2172 | 1120 | - | - | - | - | - |
| **Skin Surface Area (SA) Totals (cm2):** | | | | | | | | | **2398** | | **3749** | **4639** |

| Age Group | Body Parts SAs from Table 7-2, Page 7-6; Total SAs from Table 7-12, page 7-43 (Male) and 7-13, page 7-44 (Female) | | | | | | | Time-Weight Factor (%) | Adult Recreator and Resident |
|---|---|---|---|---|---|---|---|---|---|
| | Head $cm^2$ | Arms $cm^2$ | Forearms $cm^2$ | Hands $cm^2$ | Legs $cm^2$ | Lower Legs $cm^2$ | Feet $cm^2$ | | Surface Water and Sediment 21+ Years |
| Adult Males 21+ Years | 1360 | 3140 | 1413 | 1070 | 6820 | 2728 | 1370 | - | 7941 |
| Adult Females 21+ Years | 1140 | 2370 | 1067 | 890 | 5980 | 2392 | 1220 | - | 6709 |
| Adult Male/Female Average | 1250 | 2755 | 1240 | 980 | 6400 | 2560 | 1295 | - | 7325 |
| **Selected Skin Surface Area (SA) Totals ($cm^2$):** | | | | | | | | | **7325** |

**Notes**

- = not applicable; $cm^2$ = square centimeters; SA = skin surface area; USEPA = U.S. Environmental Protection Agency

**Sources:** USEPA, 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September 2011.

Boniol, M; Verriest, JP; Perdeux, R: Dore JF. (2007) Proportion of skin surface area of children and young adults from 2 to 18 years old. J Investig Dermatol 128(2): 461-464.

Surface area values from USEPA (2011) were converted into $cm^2$ by multiplying the skin surface areas ($m^2$) by a conversion factor of 10,000 $cm^2/m^2$.

(1) Time-weight factor is derived by dividing the age group timeframe (years) by the receptor age range (years; yellow-highlighted cell).

(2) For soil exposure, the weighted mean values for head, forearms, hands and lower legs are used.

(3) For surface water and sediment exposure, the weighted mean values for head, forearms, hands, lower legs, and feet are used.

(4) For the adult recreator, the average of the male and female skin surface area was selected.

Table A3-10.RME
Values Used for Body Weight Calculations
Reasonable Maximum Exposure: Teen Trespasser Body Weight Calculations
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Receptor Age Range (Years): | | 10 | |
|---|---|---|---|
| Age Group | Mean Body Weight (kg) | Time Weight Factor (1) (%) | Adjusted Body Weight (kg) |
| 6 to <11 years | 31.8 | 0.5 | 16 |
| 11 to <16 years | 56.8 | 0.5 | 28 |
| | | Body Weight (BW) Total (kg): | 44 |

Notes:

Source: USEPA, 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September.
Table ES-1. Summary of Exposure Factor Recommendations, Chapter 8, Body Weight, page xvii
(1) Time-weight factor is derived by dividing the age group timeframe (years) by the receptor age range (years; yellow-highlighted cell).

Table A3-11.RME
Values Used for Surface Water Ingestion Rate Calculations
Reasonable Maximum Exposure and Central Tendency Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Age Group<br>Years | Source | Time Weight Factor (1) | Upper Percentile<br>L/hour | Scenario RME or CTE Exposure Time<br>Mean<br>L/hour | Teen Trespasser RME 1 hr/day<br>Upper Percentile<br>L/hour | Teen Trespasser CTE 1 hr/day<br>Mean<br>L/hour | Child Recreator RME 1 hr/day<br>Upper Percentile<br>L/hour | Child Recreator CTE 1 hr/day<br>Mean<br>L/hour | Adult Recreator RME 1 hr/day<br>Upper Percentile<br>L/hour | Adult Recreator CTE 1 hr/day<br>Mean<br>L/hour | Outdoor Worker RME 1 hr/day<br>Upper Percentile<br>L/hour | Outdoor Worker CTE 1 hr/day<br>Mean<br>L/hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 to <2 years | USEPA, 2019, Table 3-5 | 1 | 0.119 | 0.06 | - | - | 0.119 | 0.06 | - | - | - | - |
| 6 to <11 | USEPA, 2019, Table 3-7 | 0.5 | 0.096 | 0.038 | 0.048 | 0.019 | - | - | - | - | - | - |
| 11 to <16 | USEPA, 2019, Table 3-7 | 0.5 | 0.152 | 0.044 | 0.076 | 0.022 | - | - | - | - | - | - |
| 16 to <21 | USEPA, 2019, Table 3-7 | 0.5 | 0.105 | 0.033 | - | - | - | - | 0.053 | 0.022 | 0.053 | 0.022 |
| 21+ | USEPA, 2019, Table 3-7 | 0.5 | 0.092 | 0.028 | - | - | - | - | 0.046 | 0.022 | 0.046 | 0.022 |
| | | **Time-Weighted Average (L/day)** | | | **0.124** | **0.041** | **0.119** | **0.06** | **0.0985** | **0.044** | **0.0985** | **0.044** |

**Notes:**

(1) Time-weight factor is derived by dividing the age group timeframe (years) by the receptor age range. For the adult receptors, 20 total years of exposure is split between the 16 to <21 years and 21+ years age groups.

CTE = Central Tendency Exposure; L/hour = liter per hour; L/day = liter per day; RME = Reasonable Maximum Exposure

USEPA, 2019. Exposure Factors Handbook, Chapter 3 Update, Ingesito nof Water and Other Select Liquids, February 2019.

Table A3-12.RME
Conversion from Wet Weight to Dry Weight, Consumption Rates for Crab
Reasonable Maximum Exposure and Central Tendency Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Receptor | Percent Water Content (W) for Crab (Invertebrates) (USEPA 1993) | Consumption Rate of Crab (CRC) in Wet Weight Units (g/g-day ww) | | Consumption Rate of Crab (CRC) Converted to Dry Weight (g/g-day dw) (Equation 1) |
|---|---|---|---|---|
| | | Value | Reference | |
| **Reasonable Maximum Exposure (RME) Scenario** | | | | |
| Adult Recreator and Resident | 74 | 17.5 | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages > 18 years | 4.55 |
| Child Recreator and Resident | 74 | 8.8 | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages 3 to <6 years | 2.29 |
| **Central Tendency Exposure (CTE) Scenario** | | | | |
| Adult Recreator and Resident | 74 | 5.6 | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages > 18 years | 1.46 |
| Child Recreator and Resident | 74 | 2.5 | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages 3 to <6 years | 0.65 |

General Notes:
CRC - Consumption Rate of Crab
dw - Dry Weight.
g - grams
W - percent water content
ww - wet weight

Equation 1 USEPA 2011
CRCdw (g/g-day dw) = CRCww x [(100 - W)/100]

Where:
CRCdw Consumption Rate of Crab, dry-weightt (g/g-day dw)
CRCww Consumption Rate of Crab, wet-weightt (g/g-day ww)
W percent water content (%)

References:
U.S. Environmental Protection Agency (USEPA), 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September.
U.S. Environmental Protection Agency (USEPA), 1993. Wildlife Exposure Factors Handbook, Volume 1. EPA/ 600/ R-93/187a, December.

# Values Used for Daily Intake and Dermally Absorbed Dose Calculations: Central Tendency Exposure

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Hypothetical Resident (Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSA | Ingestion Rate, soil - adult | 30 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 12 years through adult | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATnc,a}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |
| Ingestion | Hypothetical Resident (Future) | Child | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSC | Ingestion Rate, soil - child | 60 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 2 to <6 years | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATnc,c}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |
| Ingestion | Hypothetical Resident (Future) | Lifetime | Ingestion of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where IFSMadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times \left[(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})\right] +$ $\frac{EF \times IR_a}{BW_a} \times \left[(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})\right]$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 50050 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | IRSA | Ingestion Rate, soil - adult | 30 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 12 years through adult | |
| | | | | IRSC | Ingestion Rate, soil - child | 60 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 2 to <6 years | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Hypothetical Resident (Future) | Lifetime | Ingestion of Soil | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times (ED_{0-2} + ED_{2-6}) + \frac{EF \times IR_a}{BW_a} \times (ED_{6-16} + ED_{16-26})$ |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = $CS \times \left( \frac{IFS_{res-adj} \times RBA \times CF1 \times FI}{AT_c} + \frac{IR\text{-}S_c \times RBA \times CF1 \times FI}{BW_c} \right)$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 11025 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Ingestion | On-Site Recreator (Current/Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSA | Ingestion Rate, soil - adult | 30 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 12 years through adult | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRSA \times RBA \times EF \times FI\text{-}S \times EDa \times CF1}{BWa \times ATnc,a}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |
| Ingestion | On-Site Recreator (Current/Future) | Child | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRSC | Ingestion Rate, soil - child | 60 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 2 to <6 years | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (child) = $\frac{CS \times IRSC \times RBA \times EF \times FI\text{-}S \times EDc \times CF1}{BWc \times ATnc,c}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | On-Site Recreator (Current/Future) | Lifetime | Ingestion of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times IFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where IFSMadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ $\frac{EF \times IR_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 27885 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | |
| | | | | IRSA | Ingestion Rate, soil - adult | 30 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 12 years through adult | |
| | | | | IRSC | Ingestion Rate, soil - child | 60 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 2 to <6 years | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = $\frac{EF \times IR_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times IR_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = $CS \times \left(\frac{IFS_{res-adj} \times RBA \times CF1 \times FI}{AT_c} + \frac{IR\text{-}S_c \times RBA \times CF1 \times FI}{BW_c}\right)$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 6142.5 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (teen) = $\frac{CS \times IRS \times RBA \times EF \times FI\text{-}S \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRS | Ingestion Rate, soil | 60 | mg/day | USEPA, 2017 (Table 5-1; general population central tendency value for 6 to < 12 years | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (teen) = $\frac{CS \times IRS \times RBA \times EF \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATnc}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | |
| | | | | ED6-16 | Exposure Duration | 10 | years | Site-specific assumption (Youth is 6-16 years old) | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Daily Intake (mg/kg-day) for mutagenic carcinogens = $\frac{CS \times RBA \times IFSMadj \times FI\text{-}S \times CF1}{ATc}$ |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | Where IFSMadj (mg/kg) = $\frac{EF \times IRS}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Soil | IFSadj | Ingestion Rate - Age-adjusted | 163.6363636 | mg/kg | See equations | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times RBA \times FI\text{-}S \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 490.9090909 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = $\frac{EF \times IRS}{BW_{6-16}} \times (ED_{6-16})$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Ingestion | Outdoor Maintenace Worker (Current/Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRS | Ingestion Rate, soil | 50 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, adult soil and dust | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATnc}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 200 | days/year | Site-specific assumption, assume inclement or cold weather prevents work time outdoors; 40 weeks/year x 5 days/week | |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Indoor/Outdoor Commercial Worker (Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CS \times IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | IRS | Ingestion Rate, soil | 50 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, adult soil and dust | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{IRS \times RBA \times EF \times FI\text{-}S \times ED \times CF1}{BW \times ATnc}$ |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Construction Worker (Future) | Adult | Ingestion of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | CS x IRS x RBA x EF x FI-S x ED x CF1 / BW x ATc |
| | | | | IRS | Ingestion Rate, soil | 100 | mg/day | USEPA, 2017, Table 5-1 General population upper percentile, adult soil and dust | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-S | Fraction Ingested from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | IRS x RBA x EF x FI-S x ED x CF1 / BW x ATnc |
| | | | | EF | Exposure Frequency | 125 | days/year | Site-specific assumption (half-year construction project (5 days/week for 25 weeks/year) | |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Dermal Absorption | Hypothetical Resident (Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | DA-event x EV x EF x FC-S x EDa x SAa / BWa x ATnc,a |
| | | | | SAa | Skin Surface Area, adult | 6032 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.01 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; geometric mean value for grounds keeping) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| Dermal Absorption | Hypothetical Resident (Future) | Child | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | DA-event x EV x EF x FC-S x EDc x SAc / BWc x ATnc,c |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Hypothetical Resident (Future) | Child | Dermal Absorption of Soil | SAc | Skin Surface Area, child | 2373 | $cm^2$ | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Where:<br>DA-event (Absorbed Dose per Event [mg/$cm^2$-event]) =<br>CS x CF1 x AFc x ABS |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) =<br>[DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.04 | mg/$cm^2$-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; daycare children playing indoors and outdoors) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Hypothetical Resident (Future) | Lifetime | Dermal Absorption of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) =<br>$\frac{CS \times ABS \times FC\text{-}S \times CF1 \times DFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where DFSMadj (mg/kg) =<br>$\frac{EF \times AF_c \times EV \times SA_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right]$<br>$\frac{EF \times AF_a \times EV \times SA_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 81429.6 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.04 | mg/$cm^2$-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; daycare children playing indoors and outdoors) | |
| | | | | SAc | Skin Surface Area, child | 2373 | $cm^2$ | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) =<br>$\frac{CS \times ABS \times FC\text{-}S \times CF1 \times (CAFd \times DFSadj + MAFd \times DFSMadj)}{ATc}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Where DFSadj (mg/kg) =<br>$\frac{EF \times AF_c \times EV \times SA_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times AF_a \times EV \times SA_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) =<br>$CS \times FC\text{-}S \times \left(\frac{DFS_{adj} \times ABS \times CF1}{AT_c} + \frac{SA_c \times ABS \times CF1 \times EV \times AF_c}{BW_c}\right)$ |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.01 | mg/$cm^2$-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; geometric mean value for grounds keeping) | |
| | | | | SAa | Skin Surface Area, adult | 6032 | $cm^2$ | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Hypothetical Resident (Future) | Lifetime | Dermal Absorption of Soil | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CAFd | Cancer Adjustment Factor, dermal | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 18566.8 | mg/kg | See equations | |
| | | | | MAFd | Mutagenic Adjustment Factor, dermal | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Current/Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-S x EDa x SAa}}{\text{BWa x ATc}}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-S x EDa x SAa}}{\text{BWa x ATnc,a}}$ |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | SAa | Skin Surface Area, adult | 6032 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFa x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.01 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; geometric mean value for grounds keeping) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Current/Future) | Child | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = $\frac{\text{DA-event x EV x EF x FC-S x EDc x SAc}}{\text{BWc x ATc}}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = $\frac{\text{DA-event x EV x EF x FC-S x EDc x SAc}}{\text{BWc x ATnc,c}}$ |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | SAc | Skin Surface Area, child | 2373 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Where: DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AFc x ABS |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Current/Future) | Child | Dermal Absorption of Soil | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.04 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; daycare children playing indoors and outdoors) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Current/Future) | Lifetime | Dermal Absorption of Soil | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CS \times ABS \times FC\text{-}S \times CF1 \times DFSMadj}{ATc}$ |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where DFSMadj (mg/kg) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 17449.2 | mg/kg | See equations | $\frac{EF \times EV \times AF_c \times SA_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | $\frac{EF \times EV \times AF_a \times SA_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.04 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; daycare children playing indoors and outdoors) | |
| | | | | SAc | Skin Surface Area, child | 2373 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years) (forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere)) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = $\frac{CS \times ABS \times FC\text{-}S \times CF1 \times (CAFd \times DFSadj + MAFd \times DFSMadj)}{ATc}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Where DFSadj (mg/kg) = |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{EF \times EV \times AF_c \times SA_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times EV \times AF_a \times SA_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.01 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; geometric mean value for grounds keeping) | $CS \times FC\text{-}S \times \left(\frac{DFS_{res-adj} \times ABS \times CF1}{ATc} + \frac{SA_c \times ABS \times CF1 \times EV \times AF_c}{BW_c}\right)$ |
| | | | | SAa | Skin Surface Area, adult | 6032 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CAFd | Cancer Adjustment Factor, dermal | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 3978.6 | mg/kg | See equations | |
| | | | | MAFd | Mutagenic Adjustment Factor, dermal | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Soil | | | | | | |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Non-Mutagenic Constituents |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (teen) = |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | $\frac{\text{DA-event x EV x EF x FC-S x ED6-16 x SA6-16}}{\text{BW6-16 x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (teen) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | $\frac{\text{DA-event x EV x EF x FC-S x ED6-16 x SA6-16}}{\text{BW6-16 x ATnc}}$ |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.01 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for soccer player #2) | Where: |
| | | | | SA6-16 | Skin Surface Area | 3749 | cm² | USEPA 2011 (Tables 7-2; weighted average of mean values for head, hands, forearms, and lower legs (male and female, 6 to <16 years)) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens = |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | $\frac{\text{CS x ABS x FC-S x CF1 x DFSMadj}}{\text{ATc}}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | $\frac{\text{CS x ABS x FC-S x CF1 x (CAFo x DFSadj + MAFo x DFSMadj)}}{\text{ATc}}$ |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 204.4909091 | mg/kg | See equations | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 613.4727273 | mg/kg | See equations | Where DFSMadj (mg/kg) = $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times \left[(ED_{6-16} \times ADAF_{6-16})\right]$ |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | Where DFSadj (mg/kg) = $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times (ED_{6-16})$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Dermal Absorption | Outdoor Maintenace Worker (Current/Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 200 | days/year | Site-specific assumption, assume inclement or cold weather prevents work time outdoors; 40 weeks/year x 5 days/week | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | $\frac{\text{DA-event x EV x EF x FC-S x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Outdoor Maintenace Worker (Current/Future) | Adult | Dermal Absorption of Soil | AF | Soil-to-skin Adherence Factor | 0.04 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for landscaper) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Indoor/Outdoor Commercial Worker (Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x ED x SA / BW x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | DA-event x EV x EF x FC-S x ED x SA / BW x ATnc |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.02 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for grounds keepers) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Construction Worker (Future) | Adult | Dermal Absorption of Soil | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | DA-event x EV x EF x FC-S x ED x SA / BW x ATc |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 125 | days/year | Site-specific assumption (half-year construction project (5 days/week for 25 weeks/year) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FC-S | Fraction of Contact from Source, soil | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | DA-event x EV x EF x FC-S x ED x SA / BW x ATnc |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CS x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.1 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for construction workers) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |

Table A3-1.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Soil |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Hypothetical Resident (Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$ |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| Inhalation | Hypothetical Resident (Future) | Child | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (child) = |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for non-carcinogens (child) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$ |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| Inhalation | Hypothetical Resident (Future) | Lifetime | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Exposure concentration (µg/m³) for trichloroethene (lifetime) = |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[(ED_a + ED_c) \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | $CA \times \left[\frac{EF \times (ED_a + ED_c) \times ET}{AT_c \times CF1} + 1\right]$ |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Where: |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |

Table A3-2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Recreator (Current/Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATc}$ |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | Exposure concentration (µg/m³) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times EDa}{CF1 \times ATnc,a}$ |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | | | | | | |
| Inhalation | On-Site Recreator (Current/Future) | Child | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATc}$ |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | Exposure concentration (µg/m³) for noncarcinogens (adult) = $\frac{CA \times EF \times ET \times EDc}{CF1 \times ATnc,c}$ |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | | | | | | |
| Inhalation | On-Site Recreator (Current/Future) | Lifetime | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | EF | Exposure Frequency | 75 | days/year | DOE, 2020 | |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | Exposure concentration (µg/m³) for trichloroethene (lifetime) = $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[(ED_a + ED_c) \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |

Table A3-2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Recreator (Current/Future) | Lifetime | Inhalation of Windblown Dust or Vapors in Outdoor Air | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | $CA \times \left[\frac{EF \times (ED_a + ED_c) \times ET}{AT_c \times CF1} + 1\right]$ |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | Where: |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| Inhalation | Trespasser (Current/Future) | Teen | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (teen) = |
| | | | | EF | Exposure Frequency | 24 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year) | $\frac{CA \times EF \times ET \times ED6\text{-}16}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 2.5 | hours/day | USEPA, 2011 (Table 16-26; 50th percentile value (150 min/day x 1 hour/60 min) for time spent for doing outdoor recreational activities in the Southern Region of US) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Exposure concentration (µg/m³) for noncarcinogens (teen) = |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times ED6\text{-}16}{CF1 \times ATnc}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for mutagenic carcinogens (teen) = |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[(ED_{6-16} \times ADAF_{6-16})\right]$ |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | |
| | | | | | | | | | Exposure concentration (µg/m³) for trichloroethene (teen) = |
| | | | | | | | | | $\frac{CA \times EF \times ET}{AT_c \times CF1} \times \left[ED_{6-16} \times CAF_i + MAF_i \times (ED_{6-16} \times ADAF_{6-16})\right]$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Inhalation | Outdoor Maintenace Worker (Current/Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 200 | days/year | Site-specific assumption, assume inclement or cold weather prevents work time outdoors; 40 weeks/year x 5 days/week | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for noncarcinogens (adult) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |

Table A3-2.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Wind-blown Dust and Vapors in Outdoor Air from Soil
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Soil |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Indoor/ Outdoor Commercial Worker (Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 4 | hours/day | Site-specific assumption; worker spends 4 hours indoors and 4 hours outdoors during work day. | |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for noncarcinogens (adult) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | Where: |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | | | | | | |
| Inhalation | Construction Worker (Future) | Adult | Inhalation of Windblown Dust or Vapors in Outdoor Air | | | | | | Non-Mutagenic Constituents |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | EF | Exposure Frequency | 125 | days/year | Site-specific assumption (half-year construction project (5 days/week for 25 weeks/year) | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATc}$ |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | Exposure concentration (µg/m³) for noncarcinogens (adult) = |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | $\frac{CA \times EF \times ET \times ED}{CF1 \times ATnc}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where: |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | CA for Windblown Dust (µg/m³) = (CS/PEF) x CF2 |
| | | | | CS | Exposure Point Concentration, soil | Site-Specific | mg/kg | - | CA for Vapors (µg/m³) = (CS/VF) x CF2 |
| | | | | PEF | Particulate Emission Factor | Site Specific | m³/kg | USEPA, 2002 (Equations presented with RAGS Support Tables) | |
| | | | | VF | Volatilization Factor | Calculated | m³/kg | USEPA, 2002 (Equations in Attachment A4) | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | | | | | | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-3.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Adult | Ingestion of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CGW \times IRGWa \times EF \times FI\text{-}GW \times EDa}{BWa \times ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | IRGWa | Ingestion Rate, groundwater - adult | 2 | L/day | USEPA, 1991 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{CGW \times IRGWa \times EF \times FI\text{-}GW \times EDa}{BWa \times ATnc,a}$ |
| | | | | FI-GW | Fraction Ingested from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| Ingestion | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Child | Ingestion of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = $\frac{CGW \times IRGWc \times EF \times FI\text{-}GW \times EDc}{BWc \times ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | IRGWc | Ingestion Rate, groundwater - child | 0.21 | L/day | USEPA, 2019; Table 3-9 of EFH, mean value for children ages 3 to < 6 years old. | Daily Intake (mg/kg-day) for noncarcinogens (child) = $\frac{CGW \times IRGWc \times EF \times FI\text{-}GW \times EDc}{BWc \times ATnc,c}$ |
| | | | | FI-GW | Fraction Ingested from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| Ingestion | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Ingestion of Groundwater (Potable Use) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{CGW \times FI\text{-}GW \times IFWMadj}{ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | FI-GW | Fraction Ingested from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | IFWMadj | Resident Mutagenic Drinking Water Ingestion Rate | 1019.9 | L/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFWMadj (L/kg) = $\frac{EF \times IR_c}{BW_c} \times \left[(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})\right] +$ $\frac{EF \times IR_a}{BW_a} \times \left[(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})\right]$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | IRGWc | Ingestion Rate, groundwater - child | 0.21 | L/day | USEPA, 2019; Table 3-9 of EFH, mean value for children ages 3 to < 6 years old. | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = $\frac{CGW \times (CAFo \times IFWadj + MAFo \times IFWMadj) \times FI\text{-}GW}{ATc}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Resident Drinking Water Ingestion Rate - Age Adjusted (L/kg) = $\frac{EF \times IR_c}{BW_c} \times (ED_{0-2} + ED_{2-6}) + \frac{EF \times IR_a}{BW_a} \times (ED_{6-16} + ED_{16-26})$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | IRGWa | Ingestion Rate, groundwater - adult | 2 | L/day | USEPA, 1991 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = $CGW \times \left(\frac{IFW_{adj}}{AT_c} + \frac{IR\text{-}GW_c}{BW_c}\right)$ |
| | | | | IFWadj | Resident Drinking Water Ingestion Rate | 327.95 | L/kg | USEPA, 2005 | |

Table A3-3.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Construction Worker (Current/Future) | Adult | Ingestion of Groundwater (Trench Scenario) | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens = $\frac{CGW \times IRGW \times FI\text{-}GWt \times EF \times ED}{BW \times ATc}$ |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | IRGW | Ingestion Rate, groundwater | 0.028 | L/day | USEPA, 2019 | |
| | | | | FI-GWt | Fraction Ingested from Source, groundwater | 0.5 | unitless | Assume trench conditions are wet half of the time during construction (best professional judgment). | |
| | | | | EF | Exposure Frequency | 125 | days/year | Site-specific assumption (half-year construction project (5 days/week for 25 weeks/year) | Daily Intake (mg/kg-day) for noncarcinogens = $\frac{CGW \times IRGW \times FI\text{-}GWt \times EF \times ED}{BW \times ATnc}$ |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Adult | Dermal Absorption of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDa \times SA\text{-}GWa}{BWa \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-GW | Fraction of Contact from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDa \times SA\text{-}GWa}{BWa \times ATnc,a}$ |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | SA-GWa | Skin Surface Area - groundwater, adult | 19652 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female adults, 21-78)) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | For organic compounds in which t-event,a ≤ t-star: |
| | | | | | | | | | DA-event (Absorbed Dose per Event[mg/cm²-event]) = $2 \times FA \times Kp \times CGW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,a]/\pi}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | For organic compounds in which t-event,a > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $FA \times Kp \times CGW \times CF1 \times \{[t\text{-}event,a / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = $Kp \times CGW \times CF1 \times t\text{-}event,a$ |
| | | | | t-event,a | Event Duration, adult | 0.33 | hours/event | USEPA, 2011 (Tables 16-29 ; adult (16 to <21 years mean value of 20 min spent showering, assuming 1 shower/day) | |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Child | Dermal Absorption of Groundwater (Potable Use) | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDc \times SA\text{-}GWc}{BWc \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FC-GW | Fraction of Contact from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}GW \times EDc \times SA\text{-}GWc}{BWc \times ATnc,c}$ |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | SA-GWc | Skin Surface Area - groundwater, child | 6365 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female children <6 years) | Where: |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | For organic compounds in which t-event,c ≤ t-star: |
| | | | | | | | | | DA-event (Absorbed Dose per Event[mg/cm²-event]) = $2 \times FA \times Kp \times CGW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,c)/\pi]}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | For organic compounds in which t-event,c > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $FA \times Kp \times CGW \times CF1 \times \{[t\text{-}event,c / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |

Table A3-3.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Child | Dermal Absorption of Groundwater (Potable Use) | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = Kp x CGW x CF1 x t-event,c |
| | | | | t-event,c | Event Duration, child | 0.4 | hours/event | USEPA, 2011; (Table 16-29; mean value of 24 min for time spent bathing (3 to < 6 years)) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Dermal Absorption of Groundwater (Potable Use) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{\text{DA-event x DFWMres-adj}}{\text{ATc}}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | DFWMres-adj | Resident Mutagenic Water Dermal Contact Factor - Age Adjusted | 8191633 | cm²-event/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where: |
| | | | | $ET_{event\text{-}res\text{-}adj}$ | Resident Water Exposure Time - Age Adjusted | 0.6708 | hours/event | USEPA, 2005 | For organic compounds in which $ET_{event\text{-}res\text{-}adj} \leq$ t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = $2 \times FA \times Kp \times CGW \times CF1 \times \sqrt{[6 \times \text{tau-event} \times ET_{event\text{-}res\text{-}adj}]/\pi}$ |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | For organic compounds in which $ET_{event\text{-}res\text{-}adj} >$ t-star: |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | DA-event (Absorbed Dose per Event[mg/cm²-event]) = $FA \times Kp \times CGW \times CF1 \times \{[ET_{event\text{-}res\text{-}adj} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | For inorganic compounds: |
| | | | | t-event,c | Event Duration, child | 0.4 | hours/event | USEPA, 2011; (Table 16-29; mean value of 24 min for time spent bathing (3 to < 6 years)) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = $Kp \times CGW \times CF1 \times ET_{event\text{-}res\text{-}adj}$ |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Resident Water Exposure Time - Age Adjusted (hours/event) = $\frac{t\text{-event,c} \times (ED_{0-2} + ED_{2-6}) + t\text{-event,a} \times (ED_{6-16} + ED_{16-26})}{ED_{0-2} + ED_{2-6} + ED_{6-16} + ED_{16-26}}$ |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | t-event,a | Event Duration, adult | 0.33 | hours/event | USEPA, 2011 (Tables 16-29 ; adult (16 to <21 years mean value of 20 min spent showering, assuming 1 shower/day) | Resident Mutagenic Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = $EV \times EF \times \left[\frac{SA_c}{BW_c} \times (ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}) + \frac{SA_a}{BW_a} \times (ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26})\right]$ |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| Dermal Absorption | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Dermal Absorption of Groundwater (Potable Use) | SA-GWc | Skin Surface Area - groundwater, child | 6365 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female children <6 years) | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = $\frac{DA_{event} \times [(CAF_o \times DFW_{res-adj}) + (MAF_o \times DFWM_{res-adj})]}{AT_c}$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | Resident Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = $EV \times EF \times \left(\frac{ED_c \times SA_c}{BW_c} + \frac{ED_a \times SA_a}{BW_a}\right)$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | SA-GWa | Skin Surface Area - groundwater, adult | 19652 | cm² | USEPA, 2014 (USEPA, 2011; Table 7-9; weighted average of mean values for male and female adults, 21-78)) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) = $DA_{event} \times \left(\frac{DFW_{res-adj}}{AT_c} + \frac{EV \times SA_c}{BW_c}\right)$ |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFWres-adj | Resident Water Dermal Contact Factor - Age Adjusted | 2610650 | cm²-event/kg | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | | | | | | |

Table A3-3.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Groundwater
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Construction Worker (Current/Future) | Adult | Dermal Absorption of Groundwater (Trench Scenario) | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-GWt x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 125 | days/year | Site-specific assumption (half-year construction project (5 days/week for 25 weeks/year) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = |
| | | | | FC-GWt | Fraction of Contact from Source, groundwater | 0.5 | unitless | Assume trench conditions are wet half of the time during construction (best professional judgment). | $\frac{\text{DA-event x EV x EF x FC-GWt x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn) | Where:<br>For organic compounds in which t-event ≤ t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | 2 x FA x Kp x CGW x CF1 x SQRT[(6 x tau-event x t-event)/π] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | For organic compounds in which t-event > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | FA x Kp x CGW x CF1 x {[t-event / (1 + B)] + (2 x tau-event) x [(1 + 3B +3B²) / (1 + B)²]} |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event | Event Duration | 2 | hours/event | Site-specific assumption (Worker spends 2 hours/event in trench) | Kp x CGW x CF1 x t-event |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:

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Table A3-4.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Construction Worker (Future) | Adult | Inhalation of Groundwater Vapors in Trench Air | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATc \times CF1}$ |
| | | | | ET | Exposure Time | 4 | hours/day | VURAM, 2020; trench model default | |
| | | | | EF | Exposure Frequency | 65 | days/year | Site-specific assumption (3-month construction project (3 months/year x 4.3 weeks/month x 5 days/week)) | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATnc \times CF1}$ |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where: |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | CA (µg/m³) = (CGW x VFw,trench) x CF2 |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | VFw,trench | Volatilization Factor, water-to-trench air | Calculated | L/m³ | VURAM, 2020 | |
| Inhalation | Outdoor Worker (Current/Future) | Adult | Inhalation of Groundwater Vapors in Outdoor Air | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) = |
| | | | | CA | Exposure Point Concentration, air | Modeled | µg/m³ | - | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATc \times CF1}$ |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ET | Exposure Time | 8 | hours/day | USEPA, 2014 (8-hour work day) | |
| | | | | EF | Exposure Frequency | 200 | days/year | Site-specific assumption, assume inclement or cold weather prevents work time outdoors; 40 weeks/year x 5 days/week | Exposure Point Concentration, air (µg/m³) = |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATnc \times CF1}$ |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | CA (µg/m³) = (CGW x VFw,amb) x CF2 |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | |
| | | | | VFw,amb | Volatilization Factor, water-to-ambient air | Calculated | (mg/m³)-air/(mg/L)-water | ASTM, 2015 (Equations in Attachment A4) | |
| Inhalation | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Adult | Inhalation of Groundwater Vapors in Indoor Air (Showering) | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | CA | Exposure Point Concentration, shower air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ETs \times EV \times EF \times FH\text{-}GW \times EDa}{ATc \times CF1}$ |
| | | | | ETs | Exposure Time, shower | 0.14 | hours/event | See equations | |
| | | | | EV | Event Frequency | 1 | event/day | | |
| | | | | Ds | Shower Duration | 0.33 | hour/event | USEPA, 2011 (Tables 16-29 ; adult (16 to <21 years mean value of 20 min spent showering, assuming 1 shower/day) | |
| | | | | Ra | Air Exchange Rate | 0.0167 | 1/hr | Foster and Chrostowski, 1987 | Exposure concentration (µg/m³) for non-carcinogens (lifetime) = |
| | | | | ts,a | Total Time in Shower Room | 0.71 | hour | USEPA, 2014 | $\frac{CA \times ETs \times EV \times EF \times FH\text{-}GW \times EDa}{ATnc,a \times CF1}$ |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | Where: |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure Time, shower (hr/event) = |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | $\left[Ds + \frac{e^{(-Ra \times ts)}}{Ra} - \frac{e^{(Ra \times (Ds - ts))}}{Ra}\right]$ |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Note: It is assumed that the child resident does not take showers; however, early life exposure via bathing is taken into account with the mutagenic calculations. |
| | | | | | | | | | |

Table A3-4.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Hypothetical Resident (Future) and Off-Site Resident (Current/Future) | Lifetime | Inhalation of Groundwater Vapors in Indoor Air (Bathing/Shower) | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = |
| | | | | CA | Exposure Point Concentration, shower air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times EF \times EV \times ETs\text{-}adj}{ATc \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Exposure concentration (µg/m³) for trichloroethene (lifetime) = |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CA \times EF \times EV \times ETs\text{-}adj}{ATc \times CF1} \times \left[ED_r \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | EDr | Exposure Duration, lifetime | 13 | years | USEPA, 2011 (Table 16-3; mean residence time) | $CA \times \left[\frac{EF \times ED_r \times EV \times ETs\text{-}adj}{ATc \times CF1} + 1\right]$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | Where: |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | Exposure Time, shower - age adjusted (hr/event) = |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | |
| | | | | CF2 | Conversion Factor 2 | 0.0167 | hr/min | - | $\left[Ds + \frac{e^{(-Ra \times ts\text{-}adj)}}{Ra} - \frac{e^{(Ra \times (Ds - ts\text{-}adj))}}{Ra}\right]$ |
| | | | | ETs-adj | Exposure Time, shower - age adjusted | 0.08 | hours/event | See equations | |
| | | | | Ds-adj | Shower Duration | 0.625 | hours/event | USEPA, 2014; average of child and adult resident water exposure times of 0.54 hours/event and 0.71 hours/event | |
| | | | | Ra | Air Exchange Rate | 0.0167 | 1/hr | Foster and Chrostowski, 1987 | Total Time in Shower Room - age adjusted (hour) |
| | | | | ts-adj | Total Time in Shower Room - age adjusted | 0.47 | hour | See equations | $\frac{ts\text{-}c \times (ED_{0-2} + ED_{2-6}) + ts\text{-}a \times (ED_{6-16} + ED_{16-26})}{ED_{0-2} + ED_{2-6} + ED_{6-16} + ED_{16-26}}$ |
| | | | | ts-c | Total Time in Bathroom - child | 0.47 | hour | USEPA, 2011; Table 16-29, mean value of 28 min for 3 to < 6 years old, total time spent taking a bath and remaining in enclosed bathroom. | |
| | | | | ts-a | Total Time in Bathroom - adult | 0.47 | hour | USEPA, 2011; Table 16-29, mean value of 28 min for 16 to <21 years, total time spent in bathroom for shower and remaining in enclosed bathroom. | |
| Inhalation | On-Site Hypothetical Resident (Future) | Adult | Inhalation of Groundwater Vapors in Indoor Air (Vapor Intrusion) | | | | | | Non-Mutagenic Constituents |
| | | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ET\text{-}IA \times EF \times FH\text{-}GW \times EDa}{ATc \times CF1}$ |
| | | | | ET-IA | Exposure Time, indoor air | 24 | hours/day | USEPA, 2014 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | $\frac{CA \times ET\text{-}IA \times EF \times FH\text{-}GW \times EDa}{ATnc,a \times CF1}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| | | | | | | | | | |

Table A3-4.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | On-Site Hypothetical | Child | Inhalation of Groundwater | | | | | | Non-Mutagenic Constituents |
| | Resident (Future) | | Vapors in Indoor Air | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (child) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ET\text{-}IA \times EF \times FH\text{-}GW \times EDc}{ATc \times CF1}$ |
| | | | (Vapor Intrusion) | ET-IA | Exposure Time, indoor air | 24 | hours/day | USEPA, 2014 | |
| | | | | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure concentration (µg/m³) for non-carcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | $\frac{CA \times ET\text{-}IA \times EF \times FH\text{-}GW \times EDc}{ATnc,c \times CF1}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Exposure concentration (µg/m³) for carcinogens (lifetime) = |
| | | | | | | | | | [EC for carcinogens (adult) + EC for carcinogens (child)] |
| Inhalation | On-Site Hypothetical | Lifetime | Inhalation of Groundwater | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | Resident (Future) | | Vapors in Indoor Air | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for mutagenic carcinogens (lifetime) = |
| | | | | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times EF \times ET_{IA}}{AT_C \times CF1} \times \left[\left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | (Vapor Intrusion) | EF | Exposure Frequency | 350 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | ET-IA | Exposure Time, indoor air | 24 | hours/day | USEPA, 2014 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Exposure concentration (µg/m³) for trichloroethene (lifetime) = |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{CA \times EF \times ET_{IA}}{AT_C \times CF1} \times \left[ED_r \times CAF_i + MAF_i \times \left(\frac{ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6} +}{ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}}\right)\right]$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | Exposure concentration (µg/m³) for vinyl chloride (lifetime) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | $CA \times \left[\frac{EF \times ED_r \times ET_{IA}}{AT_C \times CF1} + 1\right]$ |
| | | | | EDr | Exposure Duration, lifetime | 13 | years | USEPA, 2011 (Table 16-3; mean residence time) | |
| | | | | CAFi | Cancer Adjustment Factor, inhalation | 0.756 | unitless | USEPA, 2005 | |
| | | | | MAFi | Mutagenic Adjustment Factor, inhalation | 0.244 | unitless | USEPA, 2005 | |

Table A3-4.CTE
Values Used for Daily Intake Calculations
Central Tendency Exposure: Inhalation of Vapors from Groundwater to Outdoor/Trench Air and Indoor Air (Shower/Vapor Intrusion)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Groundwater |
| Exposure Medium: | Air |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Inhalation | Indoor/Outdoor Commercial | Adult | Inhalation of Groundwater | | | | | | Non-Mutagenic Constituents |
| | Worker | | | EC | Exposure concentration | Calculated | µg/m³ | See equations | Exposure concentration (µg/m³) for carcinogens (adult) = |
| | | | Vapors in Indoor Air | CA | Exposure Point Concentration, indoor air | Modeled | µg/m³ | Calculated (See Attachment A4) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATc \times CF1}$ |
| | (Future) | | | ET | Exposure Time | 4 | hours/day | Site-specific assumption; worker spends 4 hours indoors and 4 hours outdoors during work day. | |
| | | | (Vapor Intrusion) and | EF | Exposure Frequency | 250 | days/year | USEPA, 2014 (USEPA, 1991; pg 15) | |
| | | | | FH-GW | Fraction Inhaled from Source, groundwater | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Exposure concentration (µg/m³) for non-carcinogens (adult) = |
| | | | Vapors in Outdoor Air | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | $\frac{CA \times ET \times EF \times FH\text{-}GW \times ED}{ATnc \times CF1}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 24 | hours/day | - | Where: |
| | | | | VFw,amb | Volatilization Factor, water-to-ambient air | Calculated | (mg/m³)-air/(mg/L)-wate | ASTM, 2015 (Equations in Attachment A4) | CA (µg/m³) For Outdoor Air = (CGW x VFw,amb) x CF2 |
| | | | | CF2 | Conversion Factor 2 | 1000 | µg/mg | - | CA (µg/m³) For Indoor Air = Modeled |
| | | | | CGW | Exposure Point Concentration, groundwater | Site-Specific | mg/L | - | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSWa \times EF \times FI\text{-}SW \times EDa}{BWa \times ATc}$ |
| | | | | IRSWa | Ingestion Rate, surface water - adult | 0.044 | L/day | USEPA, 2019; Time weighted average calculated based on the mean values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSW \times IRSWa \times EF \times FI\text{-}SW \times EDa}{BWa \times ATnc,a}$ |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| Ingestion | Recreator (Future) | Child | Ingestion of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSWc \times EF \times FI\text{-}SW \times EDc}{BWc \times ATc}$ |
| | | | | IRSWc | Ingestion Rate, surface water - child | 0.06 | L/day | USEPA, 2019; Table 3.5, mean value of 1 to <2 years, of EFH 2019 | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSW \times IRSWc \times EF \times FI\text{-}SW \times EDc}{BWc \times ATnc,c}$ |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Surface Water | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times FI\text{-}SW \times IFWMadj}{ATc}$ |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | IFWMadj | Resident Mutagenic Drinking Water Ingestion Rate | 6 | L/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFWMadj (L/kg) = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | $\frac{EF \times IR_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | $\frac{EF \times IR_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | IRSWc | Ingestion Rate, surface water - child | 0.06 | L/day | USEPA, 2019; Table 3.5, mean value of 1 to <2 years, of EFH 2019 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | $\frac{CSW \times (CAFo \times IFWadj + MAFo \times IFWMadj) \times FI\text{-}SW}{ATc}$ |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Resident Drinking Water Ingestion Rate - Age Adjusted (L/kg) = |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | $\frac{EF \times IR_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times IR_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | IRSWa | Ingestion Rate, surface water - adult | 0.044 | L/day | USEPA, 2019; Time weighted average calculated based on the mean values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | IFWadj | Resident Drinking Water Ingestion Rate | 1.33 | L/kg | USEPA, 2005 | $CGW \times \left(\frac{IFW_{adj}}{AT_c} + \frac{IR - GW_c}{BW_c}\right)$ |

Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Trespasser (Future) | Teen | Ingestion of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSW \times EF \times FI\text{-}SW \times ED6\text{-}16}{BW6\text{-}16 \times ATc}$ |
| | | | | IRSW | Ingestion Rate, surface water | 0.044 | L/day | USEPA, 2019; Time weighted average calculated based on the mean values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSW \times IRSW \times EF \times FI\text{-}SW \times ED6\text{-}16}{BW6\text{-}16 \times ATnc}$ |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| Ingestion | Trespasser (Future) | Teen | Ingestion of Surface Water | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times FI\text{-}SW \times IFWMadj}{ATc}$ |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | IFWMadj | Resident Mutagenic Drinking Water Ingestion Rate | 0.34 | L/kg | USEPA, 2005 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFWMadj (L/kg) = |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | $\frac{EF \times IRSW}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | |
| | | | | IRSW | Ingestion Rate, surface water, teen | 0.041 | L/day | Time weighted average calculated based on the mean values for 6 to <11 years and 11 to <16 years, from Table 3.7 of EFH 2019 | Daily Intake (mg/kg-day) for trichloroethene (teen) = |
| | | | | | | | | | $\frac{CSW \times (CAFo \times IFWadj + MAFo \times IFWMadj) \times FI\text{-}SW}{ATc}$ |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | Surface Water Ingestion Rate - Age Adjusted (L/kg) = |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | $\frac{EF \times IRSW}{BW_{6-16}} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | |
| | | | | IFWadj | Water Ingestion Rate - Age-adjusted | 0.112 | L/kg | See equations | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Ingestion | Construction Worker (Current/Future) | Adult | Ingestion of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens = |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATc}$ |
| | | | | IRSW | Ingestion Rate, surface water | 0.044 | L/day | USEPA, 2019; Time weighted average calculated based on the mean values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 15 | days/year | Receptor spends one-half month re-directing current drainage network to support construction activities | Daily Intake (mg/kg-day) for noncarcinogens = |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATnc}$ |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | |

Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Outdoor Maintenance Worker (Current/Future) | Adult | Ingestion of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens = $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATc}$ |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | IRSW | Ingestion Rate, surface water | 0.044 | L/day | USEPA, 2019; Time weighted average calculated based on the mean values, 16 to <21 years and 21+ years, from Table 3.7 of EFH | |
| | | | | FI-SW | Fraction Ingested from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency, water | 100 | days/year | Assume that half of the time spent outdoors is in wet conditions (i.e., 200 days/year divided in half) | Daily Intake (mg/kg-day) for noncarcinogens = $\frac{CSW \times IRSW \times FI\text{-}SW \times EF \times ED}{BW \times ATnc}$ |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Adult | Dermal Absorption of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA\text{-}SWa}{BWa \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA\text{-}SWa}{BWa \times ATnc,a}$ |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | SA-SWa | Skin Surface Area - surface water, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Where: |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | For organic compounds in which t-event,a ≤ t-star: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = 2 x FA x Kp x CSW x CF1 x SQRT([6 x tau-event x t-event,a]/π) |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,a > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = FA x Kp x CSW x CF1 x {[t-event,a / (1 + B)] + (2 x tau-event) x [(1 + 3B +3B²) / (1 + B)²]} |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = Kp x CSW x CF1 x t-event,a |
| | | | | t-event,a | Event Duration, adult | 1 | hours/event | DOE, 2020 ( Assume exposure time of 1 hour per event for recreational activities) | |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Child | Dermal Absorption of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDc \times SA\text{-}SWc}{BWc \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDc \times SA\text{-}SWc}{BWc \times ATnc,c}$ |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | SA-SWc | Skin Surface Area - surface water, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Where: |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | For organic compounds in which t-event,c ≤ t-star: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = 2 x FA x Kp x CSW x CF1 x SQRT[(6 x tau-event x t-event,c)/π] |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,c > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = FA x Kp x CSW x CF1 x {[t-event,c / (1 + B)] + (2 x tau-event) x [(1 + 3B +3B²) / (1 + B)²]} |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |

Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Future) | Child | Dermal Absorption of Surface Water | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = Kp x CSW x CF1 x t-event,c |
| | | | | t-event,c | Event Duration, child | 1 | hours/event | DOE, 2020 ( Assume exposure time of 1 hour per event for recreational activities) | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Lifetime | Dermal Absorption of Surface Water | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = $\frac{\text{DA-event x DFWMadj}}{\text{ATc}}$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | SA-SWa | Skin Surface Area - surface water, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Dermally Absorbed Dose (mg/kg-day) for Trichloroethene (lifetime) = $\frac{DA_{event} \times \left[\left(CAF_0 \times DFW_{res-adj}\right) + \left(MAF_0 \times DFWM_{res-adj}\right)\right]}{AT_c}$ |
| | | | | SA-SWc | Skin Surface Area - surface water, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Dermally Absorbed Dose (mg/kg-day) for Vinyl Chloride (lifetime) = $DA_{event} \times \left(\frac{DFW_{res-adj}}{AT_c} + \frac{EV \times SA\text{-}SW_c}{BW_c}\right)$ |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | Where: For organic compounds in which $ET_{event-res-adj} \leq$ t-star: DA-event (Absorbed Dose per Event [mg/cm²-event]) = $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[6 \times \text{tau-event} \times ET_{event-res-adj}]/\pi}$ |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | For organic compounds in which $ET_{event-res-adj} >$ t-star: |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | $FA \times Kp \times CSW \times CF1 \times \{[ET_{event-res-adj} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | Resident Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $EV \times EF \times \left(\frac{ED_c \times SA\text{-}SW_c}{BW_c} + \frac{ED_a \times SA\text{-}SW_a}{BW_a}\right)$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | |

Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Future) | Lifetime | Dermal Absorption of Surface Water | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | Recreator Mutagenic Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | t-event,a | Event Duration, adult | 1 | hours/event | DOE, 2020 ( Assume exposure time of 1 hour per event for recreational activities) | $EV \times EF \times \left[ \frac{SA\text{-}SW_c}{BW_c} \times (ED_{0-2} \times ADAF_{0-2} + ED_{2-6} \times ADAF_{2-6}) + \frac{SA\text{-}SW_a}{BW_a} \times (ED_{6-16} \times ADAF_{6-16} + ED_{16-26} \times ADAF_{16-26}) \right]$ |
| | | | | t-event,c | Event Duration, child | 1 | hours/event | DOE, 2020 ( Assume exposure time of 1 hour per event for recreational activities) | Recreator Water Exposure Time - Age Adjusted (hours/event) = |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | $\frac{t\text{-}event,c \times (ED_{0-2} + ED_{2-6}) + t\text{-}event,a \times (ED_{6-16} + ED_{16-26})}{ED_{0-2} + ED_{2-6} + ED_{6-16} + ED_{16-26}}$ |
| | | | | ETeventadj | Water Exposure Time - Age Adjusted | 1 | hours/event | USEPA, 2005 | |
| | | | | DFWadj | Dermal water contact factor- age-adjusted | 106037 | cm²-event/kg | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | DFWMadj | Mutagenic water dermal contact factor- age-adjusted | 333573 | cm²-event/kg | USEPA, 2005 | [DAD for mutagens (adult) + DAD for mutagens (child)] |
| | | | | | | | | | |
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Surface Water | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (teen) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA6\text{-}16}{BW6\text{-}16 \times ATc}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet | |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (teen) = |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SW \times EDa \times SA6\text{-}16}{BW6\text{-}16 \times Atnc}$ |
| | | | | SA6-16 | Skin Surface Area | 4639 | cm² | USEPA 2011 (Tables 7-2; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 6 to <16 years)) | Where: |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | For organic compounds in which t-event,t ≤ t-star: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Atnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{[6 \times tau\text{-}event \times t\text{-}event,t]/\pi}$ |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | For organic compounds in which t-event,t > t-star: |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[t\text{-}event,t / (1 + B)] + (2 \times tau\text{-}event) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event,t | Event Duration, teen | 1 | hours/event | DOE, 2020 ( Assume exposure time of 1 hour per event for recreational activities) | $Kp \times CSW \times CF1 \times t\text{-}event,t$ |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | | | | | | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (teen) = |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | $\frac{DA\text{-}event \times FC\text{-}SW \times DFWMadj}{ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for Trichloroethene (lifetime) = |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | $\frac{DA_{event} \times FC\text{-}SW \times \left[ (CAF_o \times DFW_{adj}) + (MAF_o \times DFWM_{adj}) \right]}{AT_c}$ |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | DFWadj | Dermal water contact factor- age-adjusted | 12652 | cm²-event/kg | See equations | |
| | | | | DFWMadj | Mutagenic water dermal contact factor- age-adjusted | 37955 | cm²-event/kg | See equations | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| | | | | | | | | | Receptor Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | | | | | | $EV \times EF \times \left( \frac{ED_{6-16} \times SA_{6-16}}{BW_{6-16}} \right)$ |
| | | | | | | | | | Receptor Mutagenic Water Dermal Contact Factor - Age Adjusted (cm²-event/kg) = |
| | | | | | | | | | $EV \times EF \times \left[ \frac{SA_{6-16}}{BW_{6-16}} \times (ED_{6-16} \times ADAF_{6-16}) \right]$ |

Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Outdoor Maintenance Worker (Current/Future) | Adult | Dermal Absorption of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens = $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATc}}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 100 | days/year | Assume that half of the time spent outdoors is in wet conditions (i.e., 200 days/year divided in half) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where:<br>For organic compounds in which t-event ≤ t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{\frac{6 \times \text{tau-event} \times \text{t-event}}{\pi}}$ |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | For organic compounds in which t-event > t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = $FA \times Kp \times CSW \times CF1 \times \{[\text{t-event} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = $Kp \times CSW \times CF1 \times \text{t-event}$ |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | |
| | | | | t-event | Event Duration | 2 | hours/event | Site-specific assumption (Worker spends 2 hours/event clearing drainage ways) | |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |

Table A3-5.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Dermal Absorption of Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Construction Worker (Current/Future) | Adult | Dermal Absorption of Surface Water | | | | | | Mutagenic and Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 15 | days/year | Receptor spends one-half month re-directing current drainage network to support construction activities | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens = |
| | | | | FC-SW | Fraction of Contact from Source, surface water | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{\text{DA-event x EV x EF x FC-SW x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | ED | Exposure Duration | 0.5 | years | Site-specific assumption (6 month construction project (25 weeks x 5 days/week x 0.5 year)) | |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)); assume protective work boots are worn) | Where:<br>For organic compounds in which t-event ≤ t-star:<br>DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | $2 \times FA \times Kp \times CSW \times CF1 \times \sqrt{\frac{6 \times \text{tau-event} \times \text{t-event}}{\pi}}$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 182.5 | days | USEPA, 2011 (ED x 365 days/year) | For organic compounds in which t-event > t-star: |
| | | | | t-star | Time to reach steady-state | Chemical-specific | hour | USEPA, 2004; tau-event x 2.4 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | FA | Fraction Absorbed, water | Chemical-specific | unitless | USEPA, 2004 | $FA \times Kp \times CSW \times CF1 \times \{[\text{t-event} / (1 + B)] + (2 \times \text{tau-event}) \times [(1 + 3B + 3B^2) / (1 + B)^2]\}$ |
| | | | | Kp | Permeability Coefficient, water | Chemical-specific | cm/hour | USEPA, 2004 | |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | |
| | | | | CF1 | Conversion Factor 1 | 0.001 | L/cm³ | - | For inorganic compounds: |
| | | | | tau-event | Lag time per event | Chemical-specific | hours/event | USEPA, 2004 | DA-event (Absorbed Dose per Event[mg/cm²-event]) = |
| | | | | t-event | Event Duration | 2 | hours/event | Site-specific assumption (Worker spends 2 hours/event in trench) | $Kp \times CSW \times CF1 \times \text{t-event}$ |
| | | | | B | Ratio of Kp through stratum corneum relative to compound's Kp across the viable epidermis | Chemical-specific | unitless | USEPA, 2004 | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-6.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Consumption of Fish Tissue Modeled from Surface Water
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Fish | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | Cfish | Exposure Point Concentration, fish tissue | Site-Specific | mg/kg-fish tissue | - | Cfish x CRFa x CF7 x EF-F x FI-F x EDa / BWa x ATc |
| | | | | CRFa | Consumption Rate of Fish, adult | 5.6 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages > 18 years) | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-F | Fraction Ingested, Fish | 0.25 | unitless | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Cfish x CRFa x CF7 x EF-F x FI-F x EDa / BWa x ATnc,a |
| | | | | EF-F | Exposure Frequency, Fishing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | Where: |
| | | | | BCFish | Bioconcentration factor for fish | Chemical-specific | L/kg | DOE, 2020 | Cfish (mg/kg) = CSW x BCFish (log Kow is < 4.0) |
| | | | | BAFish | Bioaccumulation factor for fish | Chemical-specific | L/kg | See Attachment A4 for chemical-specific parameters. | Cfish (mg/kg) = CSW x BAFish (log Kow is > 4.0) |
| | | | | log Kow | log octanol-water partition coefficient | Chemical-specific | unitless | USEPA, 2020 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | | | | | | |
| Ingestion | Recreator (Future) | Child | Ingestion of Fish | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | Cfish | Exposure Point Concentration, fish tissue | Site-Specific | mg/kg-fish tissue | - | Cfish x CRFc x CF7 x EF-F x FI-F x EDc / BWc x ATc |
| | | | | CRFc | Consumption Rate of Fish, child | 2.5 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages 3 to <6 years | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-F | Fraction Ingested, Fish | 0.25 | unitless | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Cfish x CRFc CF7 x EF-F x FI-F x EDc / BWc x ATnc,c |
| | | | | EF-F | Exposure Frequency, Fishing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSW | Exposure Point Concentration, surface water | Site-Specific | mg/L | - | Where: |
| | | | | BCFish | Bioconcentration factor for fish | Chemical-specific | L/kg | DOE, 2020 | Cfish (mg/kg- fish tissue) = CSW x BCFish (log Kow is < 4.0) |
| | | | | BAFish | Bioaccumulation factor for fish | Chemical-specific | L/kg | See Attachment A4 for chemical-specific parameters. | Cfish (mg/kg-fish tissue) = CSW x BAFish (log Kow is > 4.0) |
| | | | | log Kow | log octanol-water partition coefficient | Chemical-specific | unitless | USEPA, 2020 | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Fish | | | | | | Mutagenic Constituents and Equations |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CFish | Exposure Point Concentration, fish tissue | Site-Specific | mg/kg-fish tissue | - | $\frac{\text{CFish x FI-F x CRFMadj x CF7}}{\text{ATc}}$ |
| | | | | FI-F | Fraction Ingested, Fish | 0.25 | unitless | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | |
| | | | | CRFMadj | Mutgenic consumption rate of fish - Age Adjusted | 2969 | g/kg | Calculated; See equations | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where CRFMadj (g/kg) = |
| | | | | EF-F | Exposure Frequency, Fishing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | $\frac{CRF_c \, x \, EF - F}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | |
| | | | | CRFc | Consumption Rate of Fish, child | 2.5 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages 3 to <6 years | |
| | | | | CRFa | Consumption Rate of Fish, adult | 5.6 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages > 18 years) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | $\frac{CRF_a \, x \, EF - F}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | TCE and vinyl chloride are not bioaccumulative compounds and will not be evaluated for this food pathway. |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |

Notes:

- Not applicaple

(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-7.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{CSD \times IRSDa \times RBA \times EF \times FI\text{-}SD \times EDa \times CF1}{BWa \times ATc}$ |
| | | | | IRSDa | Ingestion Rate, sediment- adult | 30 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 12 years through adult | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSD \times IRSDa \times RBA \times EF \times FI\text{-}SD \times EDa \times CF1}{BWa \times ATnc,a}$ |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Recreator (Future) | Child | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{CSD \times IRSDc \times RBA \times EF \times FI\text{-}SD \times EDc \times CF1}{BWc \times ATc}$ |
| | | | | IRSDc | Ingestion Rate, sediment - child | 60 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 2 to <6 years | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | $\frac{CSD \times IRSDc \times RBA \times EF \times FI\text{-}SD \times EDc \times CF1}{BWc \times ATnc,c}$ |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Sediment | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{CSD \times RBA \times FI\text{-}SD \times CF1 \times IFSMadj}{ATc}$ |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where IFSMadj (mg/kg) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | $\frac{EF \times IRSD_c}{BW_c} \times \left[\left(ED_{0-2} \times ADAF_{0-2}\right) + \left(ED_{2-6} \times ADAF_{2-6}\right)\right] +$ |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 10725 | mg/kg | See equations | |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | $\frac{EF \times IRSD_a}{BW_a} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right) + \left(ED_{16-26} \times ADAF_{16-26}\right)\right]$ |
| | | | | IRSDa | Ingestion Rate, sediment- adult | 30 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 12 years through adult | |
| | | | | IRSDc | Ingestion Rate, sediment - child | 60 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, soil and dust, 2 to <6 years | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | $\frac{CSD \times RBA \times FI\text{-}SD \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | Where IFSadj (mg/kg) = |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | $\frac{EF \times IRSD_c}{BW_c} \times \left(ED_{0-2} + ED_{2-6}\right) + \frac{EF \times IRSD_a}{BW_a} \times \left(ED_{6-16} + ED_{16-26}\right)$ |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Daily Intake (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | $CSD \times \left(\frac{IFS_{adj} \times RBA \times CF1 \times FI}{AT_c} + \frac{IR\text{-}S_c \times RBA \times CF1 \times FI}{BW_c}\right)$ |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 2362.5 | mg/kg | See equations | |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |

Table A3-7.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Sediment | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Ingestion | Trespasser (Current/Future) | Teen | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (teen) = $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATc}$ |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | IRSD | Ingestion Rate, sediment | 50 | mg/day | USEPA, 2017 (Table 5-1; general population central tendency value for 6 to < 21 years | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (teen) = $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED6\text{-}16 \times CF1}{BW6\text{-}16 \times ATnc}$ |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | Daily Intake (mg/kg-day) for mutagenic carcinogens (teen) = $\frac{CSD \times RBA \times FI\text{-}SD \times CF1 \times IFSMadj}{ATc}$ |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Where IFSMadj (mg/kg) = $\frac{EF \times IRSD}{BW_{6-16}} \times \left[\left(ED_{6-16} \times ADAF_{6-16}\right)\right]$ |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | IFSMadj | Mutagenic Ingestion Rate - Age-adjusted | 818 | mg/kg | See equations | |
| | | | | IFSadj | Ingestion Rate - Age-adjusted | 273 | mg/kg | See equations | Daily Intake (mg/kg-day) for trichloroethene (teen) = $\frac{CSD \times RBA \times FI\text{-}SD \times CF1 \times (CAFo \times IFSadj + MAFo \times IFSMadj)}{ATc}$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | Where IFSadj (mg/kg) = $\frac{EF \times IRSD}{BW_{6-16}} \times \left(ED_{6-16}\right)$ |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Ingestion | Outdoor Maintenace Worker (Current/Future) | Adult | Ingestion of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED \times CF1}{BW \times ATc}$ |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | IRSD | Ingestion Rate, sediment | 50 | mg/day | USEPA, 2017, Table 5-1 General population central tendency, adult soil and dust | |
| | | | | RBA | Relative Bioavailability Factor | Chemical-Specific | unitless | Default of 1 is assumed except for arsenic (RBA = 0.6); USEPA, 2020 | Daily Intake (mg/kg-day) for noncarcinogens (adult) = $\frac{CSD \times IRSD \times RBA \times EF \times FI\text{-}SD \times ED \times CF1}{BW \times ATnc}$ |
| | | | | FI-SD | Fraction Ingested from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | EF | Exposure Frequency | 200 | days/year | Site-specific assumption, assume inclement or cold weather prevents work time outdoors; 40 weeks/year x 5 days/week | |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Adult | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times EDa \times SAa}{BWa \times ATc}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = $\frac{DA\text{-}event \times EV \times EF \times FC\text{-}SD \times EDa \times SAa}{BWa \times ATnc,a}$ |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | |
| | | | | SAa | Skin Surface Area, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | $CSD \times CF1 \times AFa \times ABS$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = |

Table A3-7.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Recreator (Future) | Adult | Dermal Absorption of Sediment | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.01 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; geometric mean value for grounds keeping) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Child | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (child) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-SD x EDc x SAc}}{\text{BWc x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (child) = |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | $\frac{\text{DA-event x EV x EF x FC-SD x EDc x SAc}}{\text{BWc x ATnc,c}}$ |
| | | | | SAc | Skin Surface Area, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Where: |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | CSD x CF1 x AFc x ABS |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | Dermally Absorbed Dose (mg/kg-day) for carcinogens (lifetime) = |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.04 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; daycare children playing indoors and outdoors) | [DAD for carcinogens (adult) + DAD for carcinogens (child)] |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |
| Dermal Absorption | Recreator (Future) | Lifetime | Dermal Absorption of Sediment | | | | | | Mutagenic Constituents and Equations for Trichloroethene and Vinyl Chloride |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | $\frac{\text{CSD x ABS x FC-SD x CF1 x DFSMadj}}{\text{ATc}}$ |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Where DFSMadj (mg/kg) = |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | $\frac{EF\times EV\times AF_c\times SA_c}{BW_c}\times\left[\left(ED_{0-2}\times ADAF_{0-2}\right)+\left(ED_{2-6}\times ADAF_{2-6}\right)\right]$ |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 9168 | mg/kg | See equations | $\frac{EF\times EV\times AF_a\times SA_a}{BW_a}\times\left[\left(ED_{6-16}\times ADAF_{6-16}\right)+\left(ED_{16-26}\times ADAF_{16-26}\right)\right]$ |
| | | | | EF | Exposure Frequency, water | 38 | days/year | DOE, 2020 (Receptor spends half of the time in wet conditions (i.e., 75 days/year divided in half)) | |
| | | | | AFc | Soil-to-skin Adherence Factor, child | 0.04 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; daycare children playing indoors and outdoors) | |
| | | | | SAc | Skin Surface Area, child | 2398 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | $\frac{\text{CSD x ABS x FC-SD x CF1 x (CAFd x DFSadj + MAFd x DFSMadj)}}{\text{ATc}}$ |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Where DFSadj (mg/kg) = |
| | | | | AFa | Soil-to-skin Adherence Factor, adult | 0.01 | mg/cm²-event | USEPA, 2014 (USEPA, 2004; Exhibit 3-5; geometric mean value for grounds keeping) | $\frac{EF\times EV\times AF_c\times SA_c}{BW_c}\times\left(ED_{0-2}+ED_{2-6}\right)+\frac{EF\times EV\times AF_a\times SA_a}{BW_a}\times\left(ED_{6-16}+ED_{16-26}\right)$ |
| | | | | SAa | Skin Surface Area, adult | 7325 | cm² | USEPA, 2011 (derivation provided in RAGS Table 4-9) | Dermally Absorbed Dose (mg/kg-day) for vinyl chloride (lifetime) = |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | $CSD\times\left(\frac{DFS_{adj}\times ABS\times CF1}{AT_c}+\frac{SA_c\times ABS\times CF1\times EV\times AF_c}{BW_c}\right)$ |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CAFd | Cancer Adjustment Factor, dermal | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 2154 | mg/kg | See equations | |
| | | | | MAFd | Mutagenic Adjustment Factor, dermal | 0.202 | unitless | USEPA, 2005 | |
| | | | | | | | | | |
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (teen) = |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | $\frac{\text{DA-event x EV x EF x FC-SD x ED6-16 x SA6-16}}{\text{BW6-16 x ATc}}$ |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |

Table A3-7.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Dermal Absorption | Trespasser (Current/Future) | Teen | Dermal Absorption of Sediment | EF | Exposure Frequency, water | 12 | days/year | VDEQ, 2020 (Assume exposure occurs 6 days per month, 4 months per year; half of the time spent outdoors is in wet conditions) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (teen) = $\frac{\text{DA-event x EV x EF x FC-SD x ED6-16 x SA6-16}}{\text{BW6-16 x ATnc}}$ |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | SA6-16 | Skin Surface Area | 4639 | cm² | USEPA 2011 (Tables 7-2; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 6 to <16 years)) | Where: |
| | | | | BW6-16 | Body Weight, 6-16 years | 44 | kg | USEPA, 2011 (Table ES-1; average of the mean body weights for children ages 6 to < 11 years and 11 to <16 years old) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CSD x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 3650 | days | USEPA, 1989 (ED x 365 days/year) | Mutagenic Constituents and Equations for Trichloroethene |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | Dermally Absorbed Dose (mg/kg-day) for mutagenic carcinogens (teen) = $\frac{\text{CSD x FC-SD x ABS x CF1 x DFSMadj}}{\text{ATc}}$ |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.01 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for soccer player #2) | Where DFSMadj (mg/kg) = |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | DFSMadj | Mutagenic dermal contact factor- age-adjusted | 380 | mg/kg | See equations | $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times [(ED_{6-16} \times ADAF_{6-16})]$ |
| | | | | CAFo | Cancer Adjustment Factor, oral | 0.804 | unitless | USEPA, 2005 | |
| | | | | DFSadj | Dermal contact factor- age-adjusted | 127 | mg/kg | See equations | |
| | | | | MAFo | Mutagenic Adjustment Factor, oral | 0.202 | unitless | USEPA, 2005 | Dermally Absorbed Dose (mg/kg-day) for trichloroethene (lifetime) = $\frac{\text{CSD x FC-SD x ABS x CF1 x (CAFo x DFSadj + MAFo x DFSMadj)}}{\text{ATc}}$ |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | Where DFSadj (mg/kg) = $\frac{EF \times EV \times AF \times SA_{6-16}}{BW_{6-16}} \times (ED_{6-16})$ |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | Note: Mutagen equation is used for vinyl chloride; early life (0 to 6 years) is not affected by this scenario. |
| Dermal Absorption | Outdoor Maintenace Worker (Current/Future) | Adult | Dermal Absorption of Sediment | | | | | | Non-Mutagenic Constituents |
| | | | | DAD | Dermally Absorbed Dose | Calculated | mg/kg-day | See equations | Dermally Absorbed Dose (mg/kg-day) for carcinogens (adult) = $\frac{\text{DA-event x EV x EF x FC-SD x ED x SA}}{\text{BW x ATc}}$ |
| | | | | DA-event | Absorbed Dose per Event | Calculated | mg/cm²-event | USEPA, 2004 | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | EF | Exposure Frequency | 200 | days/year | Site-specific assumption, assume inclement or cold weather prevents work time outdoors; 40 weeks/year x 5 days/week | |
| | | | | FC-SD | Fraction of Contact from Source, sediment | 1 | unitless | USEPA, 1989 (Default of 1 (100%) is assumed) | Dermally Absorbed Dose (mg/kg-day) for noncarcinogens (adult) = |
| | | | | ED | Exposure Duration | 6.7 | years | USEPA, 2011 (Table 16-2, average of men and women occupational mobility, all ages > 16 years) | $\frac{\text{DA-event x EV x EF x FC-SD x ED x SA}}{\text{BW x ATnc}}$ |
| | | | | SA | Skin Surface Area | 3527 | cm² | USEPA, 2014 (USEPA, 2011; Tables 7-12 and 7-13; Weighted average of mean values for head, hands, and forearms (male and female, 21+years)) | Where: |
| | | | | BW | Body Weight | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | DA-event (Absorbed Dose per Event [mg/cm²-event]) = CSD x CF1 x AF x ABS |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | ATnc | Averaging Time, noncarcinogens | 2445.5 | days | USEPA, 2011 (ED x 365 days/year) | |
| | | | | EV | Event Frequency | 1 | events/day | USEPA, 2004 | |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | CF1 | Conversion Factor 1 | 0.000001 | kg/mg | - | |
| | | | | AF | Soil-to-skin Adherence Factor | 0.04 | mg/cm²-event | USEPA, 2004 (Exhibit 3-3; geometric mean value for landscaper) | |
| | | | | ABS | Dermal Absorption Factor, soil | Chemical-Specific | unitless | USEPA, 2004 | |
| | | | | | | | | | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

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Table A3-7.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Incidental Ingestion and Dermal Absorption of Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|


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Table A3-8.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Consumption of Crab Tissue Modeled from Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Adult | Ingestion of Crab | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (adult) = |
| | | | | Ccrab | Exposure Point Concentration, crab tissue | Site-Specific | mg/kg-crab tissue | - | Ccrab x CRCa x EF-C x EDa x CF7 x FI-C / BWa x ATc |
| | | | | CRCa | Consumption Rate of Crab, adult | 5.6 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages > 18 years) | |
| | | | | EF-C | Exposure Frequency, Crabbing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Daily Intake (mg/kg-day) for noncarcinogens (adult) = |
| | | | | FI-C | Fraction Ingested, Crabs | 0.25 | unitless | Assumed that the recreator eats crabs year round, but only a quarter of it is wild caught. | Ccrab x CRCa x EF-C x EDa x CF7 x FI-C / BWa x ATnc,a |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | Where: |
| | | | | EDa | Exposure Duration, adult | 7 | years | USEPA, 2011 (EDr (13 years) - EDc (6 years)) | Ccrab (mg/kg-crab tissue) = (CSD/foc) x BSAF x CL |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,a | Averaging Time, noncarcinogens - adult | 2555 | days | USEPA, 2011 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | foc | Fraction of organic carbon in sediment | 0.01 | unitless | ODEQ, 2007 | |
| | | | | BSAF | Biota-to-sediment accumulation factor | Chemical-specific | unitless | See Attachment A4 for chemical-specific parameters. | |
| | | | | CL | Lipid content | 0.03 | unitless | ODEQ, 2007 | |
| Ingestion | Recreator (Future) | Child | Ingestion of Crab | | | | | | Non-Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for carcinogens (child) = |
| | | | | Ccrab | Exposure Point Concentration, crab tissue | Site-Specific | mg/kg-crab tissue | - | Ccrab x CRCc x EF-C x EDc x CF7 x FI-C / BWc x ATc |
| | | | | CRCc | Consumption Rate of Crab, child | 2.5 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages 3 to <6 years | |
| | | | | EF-C | Exposure Frequency, Crabbing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Daily Intake (mg/kg-day) for noncarcinogens (child) = |
| | | | | FI-C | Fraction Ingested, Crabs | 0.25 | unitless | Assumed that the recreator eats crabs year round, but only a quarter of it is wild caught. | Ccrab x CRCc x EF-C x EDc x CF7 x FI-C / BWc x ATnc,c |
| | | | | EDc | Exposure Duration, child | 6 | years | USEPA, 2014 (USEPA, 1991; pp 6 and 15) | |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | Where: |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | Ccrab (mg/kg-crab tissue) = (CSD/foc) x BSAF x CL |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | Daily Intake for carcinogens (lifetime) (mg/kg-day) = |
| | | | | ATnc,c | Averaging Time, noncarcinogens - child | 2190 | days | USEPA, 1989 (ED x 365 days/year) | [DI for carcinogens (adult) + DI for carcinogens (child)] |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | foc | Fraction of organic carbon in sediment | 0.01 | unitless | ODEQ, 2007 | |
| | | | | BSAF | Biota-to-sediment accumulation factor | Chemical-specific | unitless | See Attachment A4 for chemical-specific parameters. | |
| | | | | CL | Lipid content | 0.03 | unitless | ODEQ, 2007 | |

Table A3-8.CTE
Values Used for Daily Intake and Dermally Absorbed Dose Calculations
Central Tendency Exposure: Consumption of Crab Tissue Modeled from Sediment
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | See Below |
| Medium: | Sediment |
| Exposure Medium: | Sediment |

| Exposure Route | Receptor Population (1) | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake and Dermally Absorbed Dose Equations/ Model Name |
|---|---|---|---|---|---|---|---|---|---|
| Ingestion | Recreator (Future) | Lifetime | Ingestion of Crab | | | | | | Mutagenic Constituents |
| | | | | DI | Daily Intake | Calculated | mg/kg-day | See equations | Daily Intake (mg/kg-day) for mutagenic carcinogens (lifetime) = |
| | | | | Ccrab | Exposure Point Concentration, crab tissue | Site-Specific | mg/kg-crab tissue | - | Ccrab x FI-C x CF7 x CRCMadj / ATc |
| | | | | FI-C | Fraction Ingested, Crabs | 0.25 | unitless | Assumed that the recreator eats crabs year round, but only a quarter of it is wild caught. | |
| | | | | CF7 | Conversion Factor 7 | 0.001 | kg/g | - | Where CRCMadj (mg/kg) = |
| | | | | CRCMadj | Mutgenic consumption rate of crab - Age Adjusted | 2969 | g/kg | Calculated; See equations | $\frac{CRC_c \times EF - C}{BW_c} \times [(ED_{0-2} \times ADAF_{0-2}) + (ED_{2-6} \times ADAF_{2-6})] +$ |
| | | | | CRCc | Consumption Rate of Crab, child | 2.5 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages 3 to <6 years | $\frac{CRC_a \times EF - C}{BW_a} \times [(ED_{6-16} \times ADAF_{6-16}) + (ED_{16-26} \times ADAF_{16-26})]$ |
| | | | | CRCa | Consumption Rate of Crab, adult | 5.6 | g/day | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages > 18 years) | |
| | | | | EF-C | Exposure Frequency, Crabbing | 365 | days/year | Assumed that the recreator eats fish year round, but only a quarter of it is wild caught. | Where: |
| | | | | ED0-2 | Exposure Duration, 0-2 years | 2 | years | USEPA, 2005 | Ccrab (mg/kg-crab tissue) = (CSD/foc) x BSAF x CL |
| | | | | ED2-6 | Exposure Duration, 2-6 years | 4 | years | USEPA, 2005 | |
| | | | | ED6-16 | Exposure Duration, 6-16 years | 10 | years | USEPA, 2005 | |
| | | | | ED16-26 | Exposure Duration, 16-26 years | 10 | years | USEPA, 2005 | TCE and vinyl chloride are not bioaccumulative compounds and will not be evaluated for this food pathway. |
| | | | | ADAF0-2 | Age Depend. Adjust. Factor, 0-2 years | 10 | unitless | USEPA, 2005 | |
| | | | | ADAF2-6 | Age Depend. Adjust. Factor, 2-6 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF6-16 | Age Depend. Adjust. Factor, 6-16 years | 3 | unitless | USEPA, 2005 | |
| | | | | ADAF16-26 | Age Depend. Adjust. Factor, 16-26 years | 1 | unitless | USEPA, 2005 | |
| | | | | BWa | Body Weight, adult | 80 | kg | USEPA, 2014 (USEPA, 2011; Tables 8-3; weighted mean values adults 21-78) | |
| | | | | BWc | Body Weight, child | 15 | kg | USEPA, 2014 (USEPA, 2011; Table 8-1; weighted average of mean body weights (birth to < 6 years)) | |
| | | | | ATc | Averaging Time, carcinogens | 25550 | days | USEPA, 1989 (ED (70 years) x 365 days/year) | |
| | | | | CSD | Exposure Point Concentration, sediment | Site-Specific | mg/kg | - | |
| | | | | foc | Fraction of organic carbon in sediment | 0.01 | unitless | ODEQ, 2007 | |
| | | | | BSAF | Biota-to-sediment accumulation factor | Chemical-specific | unitless | See Attachment A4 for chemical-specific parameters. | |
| | | | | CL | Lipid content | 0.03 | unitless | ODEQ, 2007 | |

Notes:
- Not applicaple
(1) Receptor populations listed below are onsite unless otherwise indicated

References:


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U.S. Environmental Protection Agency (USEPA), 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September 2011.

U.S. Environmental Protection Agency (USEPA), 2014. Human Health Evaluation Manual. Supplemental Guidance: Update of Standard Default Exposure Factors. Office of Superfund Remediation and Technology Innovation. OSWER Directive 9200.1-120. February 6. Amended September 2015.

**Table A3-9.CTE**
**Values Used for Skin Surface Areas Calculations**
**Central Tendency Exposure: Trespasser, Recreator and Hypothetical Resident Scenarios**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Age Group | Mean Surface Area by Body Part [9] (USEPA, 2011; Table 7-2, Page 7-6) | | | | | | | Receptor Age Range (Years): 6 | Child Recreator and Resident | 10 | Teen Trespasser | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Head $cm^2$ | Arms $cm^2$ | Forearms $cm^2$ | Hands $cm^2$ | Legs $cm^2$ | Lower Legs $cm^2$ | Feet $cm^2$ | Time-Weight Factor [1] (%) | Surface Water and Sediment [3] 0-6 years | Time-Weight Factor [1] (%) | Soil [2] 6-16 years | Surface Water and Sediment [3] 6-16 years |
| Birth to 1 month | 530 | 400 | 180 | 150 | 600 | 240 | 190 | 0.01 | 18 | - | - | - |
| 1 to <3 months | 600 | 450 | 202.5 | 170 | 680 | 272 | 210 | 0.03 | 40 | - | - | - |
| 3 to <6 months | 690 | 520 | 234 | 200 | 780 | 312 | 250 | 0.04 | 67 | - | - | - |
| 6 to <12 months | 820 | 620 | 279 | 240 | 930 | 372 | 290 | 0.08 | 167 | - | - | - |
| 1 to <2 years | 870 | 690 | 310.5 | 300 | 1220 | 488 | 330 | 0.17 | 383 | - | - | - |
| 2 to <3 years | 510 | 880 | 396 | 280 | 1540 | 616 | 380 | 0.17 | 364 | - | - | - |
| 3 to <6 years | 600 | 1060 | 477 | 370 | 1950 | 780 | 490 | 0.5 | 1359 | - | - | - |
| 6 to <11 years | 660 | 1510 | 680 | 510 | 3110 | 1244 | 730 | - | - | 0.50 | 1547 | 1912 |
| 11 to <16 years | 730 | 2270 | 1022 | 720 | 4830 | 1932 | 1050 | - | - | 0.50 | 2202 | 2727 |
| 16 to <21 years | 760 | 2690 | 1211 | 830 | 5430 | 2172 | 1120 | - | - | - | - | - |
| **Skin Surface Area (SA) Totals (cm2):** | | | | | | | | | **2398** | | **3749** | **4639** |

| Age Group | Body Parts SAs from Table 7-2, Page 7-6; Total SAs from Table 7-12, page 7-43 (Male) and 7-13, page 7-44 (Female) | | | | | | | Time-Weight Factor (%) | Adult Recreator and Resident |
|---|---|---|---|---|---|---|---|---|---|
| | Head $cm^2$ | Arms $cm^2$ | Forearms $cm^2$ | Hands $cm^2$ | Legs $cm^2$ | Lower Legs $cm^2$ | Feet $cm^2$ | | Surface Water and Sediment 21+ Years |
| Adult Males 21+ Years | 1360 | 3140 | 1413 | 1070 | 6820 | 2728 | 1370 | - | 7941 |
| Adult Females 21+ Years | 1140 | 2370 | 1067 | 890 | 5980 | 2392 | 1220 | - | 6709 |
| Adult Male/Female Average | 1250 | 2755 | 1240 | 980 | 6400 | 2560 | 1295 | - | 7325 |
| **Selected Skin Surface Area (SA) Totals ($cm^2$):** | | | | | | | | | **7325** |

**Notes**

- = not applicable; $cm^2$ = square centimeters; SA = skin surface area; USEPA = U.S. Environmental Protection Agency

**Sources:** USEPA, 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September 2011.

Boniol, M; Verriest, JP; Perdeux, R: Dore JF. (2007) Proportion of skin surface area of children and young adults from 2 to 18 years old. J Investig Dermatol 128(2): 461-464.

Surface area values from USEPA (2011) were converted into $cm^2$ by multiplying the skin surface areas ($m^2$) by a conversion factor of 10,000 $cm^2/m^2$.

(1) Time-weight factor is derived by dividing the age group timeframe (years) by the receptor age range (years; yellow-highlighted cell).

(2) For soil exposure, the weighted mean values for head, forearms, hands and lower legs are used.

(3) For surface water and sediment exposure, the weighted mean values for head, forearms, hands, lower legs, and feet are used.

(4) For the adult recreational user, the average of the male and female skin surface area was selected.

Table A3-10.CTE
Values Used for Body Weight Calculations
Central Tendency Exposure: Teen Trespasser Body Weight Calculations
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Receptor Age Range (Years): | | 10 | |
|---|---|---|---|
| Age Group | Mean Body Weight (kg) | Time Weight Factor (1) (%) | Adjusted Body Weight (kg) |
| 6 to <11 years | 31.8 | 0.5 | 16 |
| 11 to <16 years | 56.8 | 0.5 | 28 |
| Body Weight (BW) Total (kg): | | | 44 |

**Notes:**

**Source:** USEPA, 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September. Table ES-1. Summary of Exposure Factor Recommendations, Chapter 8, Body Weight, page xvii

(1) Time-weight factor is derived by dividing the age group timeframe (years) by the receptor age range (years; yellow-highlighted cell).

Table A3-11.CTE
Values Used for Surface Water Ingestion Rate Calculations
Reasonable Maximum Exposure and Central Tendency Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Age Group<br>Years | Source | Time<br>Weight Factor (1) | Upper Percentile<br>L/hour | Scenario<br>RME or CTE<br>Exposure Time<br>Mean<br>L/hour | Teen Trespasser<br>RME<br>1 hr/day<br>Upper Percentile<br>L/hour | Teen Trespasser<br>CTE<br>1 hr/day<br>Mean<br>L/hour | Child Recreator<br>RME<br>1 hr/day<br>Upper Percentile<br>L/hour | Child Recreator<br>CTE<br>1 hr/day<br>Mean<br>L/hour | Adult Recreator<br>RME<br>1 hr/day<br>Upper Percentile<br>L/hour | Adult Recreator<br>CTE<br>1 hr/day<br>Mean<br>L/hour | Outdoor Worker<br>RME<br>1 hr/day<br>Upper Percentile<br>L/hour | Outdoor Worker<br>CTE<br>1 hr/day<br>Mean<br>L/hour |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 to <2 years | USEPA, 2019, Table 3-5 | 1 | 0.119 | 0.06 | - | - | 0.119 | 0.06 | - | - | - | - |
| 6 to <11 | USEPA, 2019, Table 3-7 | 0.5 | 0.096 | 0.038 | 0.048 | 0.019 | - | - | - | - | - | - |
| 11 to <16 | USEPA, 2019, Table 3-7 | 0.5 | 0.152 | 0.044 | 0.076 | 0.022 | - | - | - | - | - | - |
| 16 to <21 | USEPA, 2019, Table 3-7 | 0.5 | 0.105 | 0.033 | - | - | - | - | 0.053 | 0.022 | 0.053 | 0.022 |
| 21+ | USEPA, 2019, Table 3-7 | 0.5 | 0.092 | 0.028 | - | - | - | - | 0.046 | 0.022 | 0.046 | 0.022 |
| | | **Time-Weighted Average (L/day)** | | | **0.124** | **0.041** | **0.119** | **0.06** | **0.0985** | **0.044** | **0.0985** | **0.044** |

**Notes:**

(1) Time-weight factor is derived by dividing the age group timeframe (years) by the receptor age range. For the adult receptors, 20 total years of exposure is split between the 16 to <21 years and 21+ years age groups.

CTE = Central Tendency Exposure; L/hour = liter per hour; L/day = liter per day; RME = Reasonable Maximum Exposure

USEPA, 2019. Exposure Factors Handbook, Chapter 3 Update, Ingesito nof Water and Other Select Liquids, February 2019.

Table A3-12.CTE
Conversion from Wet Weight to Dry Weight, Consumption Rates for Crab
Reasonable Maximum Exposure and Central Tendency Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| Receptor | Percent Water Content (W) for Crab (Invertebrates) (USEPA 1993) | Consumption Rate of Crab (CRC) in Wet Weight Units (g/g-day ww) | | Consumption Rate of Crab (CRC) Converted to Dry Weight (g/g-day dw) (Equation 1) |
|---|---|---|---|---|
| | | Value | Reference | |
| Reasonable Maximum Exposure (RME) Scenario | | | | |
| Adult Recreator and Resident | 74 | 17.5 | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages > 18 years | 4.55 |
| Child Recreator and Resident | 74 | 8.8 | USEPA, 2011 (Table 10-3, 95th percentile value for recreational marine fish intake for Atlantic, ages 3 to <6 years | 2.29 |
| Central Tendency Exposure (CTE) Scenario | | | | |
| Adult Recreator and Resident | 74 | 5.6 | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages > 18 years | 1.46 |
| Child Recreator and Resident | 74 | 2.5 | USEPA, 2011 (Table 10-3, mean value for recreational marine fish intake for Atlantic, ages 3 to <6 years | 0.65 |

General Notes:
CRC - Consumption Rate of Crab
dw - Dry Weight.
g - grams
W - percent water content
ww - wet weight

Equation 1 USEPA 2011
CRCdw (g/g-day dw) = CRCww x [(100 - W)/100]

Where:
CRCdw Consumption Rate of Crab, dry-weightt (g/g-day dw)
CRCww Consumption Rate of Crab, wet-weightt (g/g-day ww)
W percent water content (%)

References:
U.S. Environmental Protection Agency (USEPA), 2011. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September.
U.S. Environmental Protection Agency (USEPA), 1993. Wildlife Exposure Factors Handbook, Volume 1. EPA/ 600/ R-93/187a, December.

# Human Health Exposure Assessment

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 6960 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 7.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 6850 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 130 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 5.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000012 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 8970 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 1.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 5210 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 40.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 4.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.044 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.00000038 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 7490 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 0.85 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 7.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 0.21 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 13.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 8.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 6350 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 17.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 148 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.16 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 0.18 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.05 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 12 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 26.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.00000035 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 8610 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 0.82 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 0.16 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 5.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 5970 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 5.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 154 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.04 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 0.17 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.045 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 11.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 16.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.0588 | 1 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.0227 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 19900 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 63.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 7.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 21.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 49.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 9.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 854 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 45100 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 2120 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 1490 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 1.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 84.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.053 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 51 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 4280 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.0192 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 7060 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 18.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 19.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 416 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 8680 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 1070 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 261 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.34 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.043 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 12 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 1190 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.0509 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 9520 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 18 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 4.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 4.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 23.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 3.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 193 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 11800 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 351 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 292 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.18 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 4.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.046 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 16.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 603 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.197 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 9000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 11.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 4.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 3.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 19.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 3.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 119 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 10400 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 509 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 286 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.19 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 2.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.043 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 14 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 554 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 10200 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 2.5 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 10 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 3.3 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 8880 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.09 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 6520 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 1.1 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 5.7 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 4250 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.059 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 8870 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 4.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 10 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 7640 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 137 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 5.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 21100 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 4.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 20.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 4.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 18700 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 132 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 9.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.11 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.106 | 1 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.126 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 27300 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 11.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 6.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 11.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 78.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 4.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 1790 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 12300 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 573 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 326 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.16 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 24.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.044 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 12.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 708 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.117 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.175 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 38600 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 29.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 7.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 21.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 616 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 5.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 5100 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 16500 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 1450 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 398 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.18 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 31.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.046 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 15.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 1140 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 10300 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 2.7 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 11 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 3.1 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 8690 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.049 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 13300 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 2.2 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 11.4 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 4.3 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 10600 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.054 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 7760 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 4.4 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 9.7 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 6440 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.079 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 7010 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 1.7 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 6.5 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 1.6 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 4080 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.029 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.00000043 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 9960 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 0.97 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 1.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 10.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 26.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 7070 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 16.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 233 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.061 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 0.2 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.079 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 13.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 64.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Surface Soil \| Include \| 4,4'-DDD \| PEST | 0.0013 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 12100 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 0.89 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 0.45 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 10.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 3.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 8.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 8600 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 7.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 230 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.091 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 0.18 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.15 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 16.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 22.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 2.49 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 1.91 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 1.39 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.388 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 6000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 10.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 5050 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 195 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 10.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.099 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 1.77 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 1.59 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 1.11 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00012 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 4600 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 2.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 126 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 28 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 24800 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 372 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 502 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.068 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 8810 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 1.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 8.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 6640 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 65.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 4.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.055 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000022 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 6870 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 7.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 5640 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 110 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 3.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.036 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 5740 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 1.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 5.3 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 1.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 3520 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 45.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Nickel \| TMET | 2.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 0.03 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 5110 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 1.2 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 4.8 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 1.2 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 3460 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.083 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Aluminum \| TMET | 14300 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Arsenic \| TMET | 2.3 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Chromium \| TMET | 11.5 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Cobalt \| TMET | 2.8 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Iron \| TMET | 8710 | 1 |
| SO \| N/W \| Surface Soil \| Include \| Thallium \| TMET | 0.18 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000022 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.25 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 27000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 7100 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 770 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 270 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 13 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 1.6 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 9.9 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3.5 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 19 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 55 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 2.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 2400 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 11 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 600 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 12000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 8400 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 260 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 0.3 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 0.9 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 3.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 0.24 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 12 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 18 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 16 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 26 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 15 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.052 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.01 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 11000 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 980 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 15 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 8.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 15 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 430 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 160000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 250 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 6.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 3.4 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 58 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 180 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 15 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.047 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Iron \| TMET | 20000 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Lead \| TMET | 190 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Manganese \| TMET | 330 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Silver \| TMET | 4.6 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Thallium \| TMET | 1.2 | 0 |
| SO \| C/S \| Surface Soil \| Include \| Antimony \| TMET | 2.8 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Arsenic \| TMET | 4.7 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cadmium \| TMET | 1.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Chromium \| TMET | 17 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Cobalt \| TMET | 4.1 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Copper \| TMET | 56 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Vanadium \| TMET | 14 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Zinc \| TMET | 160 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Mercury \| TMET | 0.045 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000258 | 1 |
| SO \| C/S \| Surface Soil \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000225 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6960 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 7.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 6850 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 130 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 5.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000017 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000012 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 8970 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 1.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 5210 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 40.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 4.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.044 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.185 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.361 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.00018 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.000072 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 2.83 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000012 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000023 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6670 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.8 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.96 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 5.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 1.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 2330 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.00000038 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 7490 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.85 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 7.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.21 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 13.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 8.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 6350 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 17.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 148 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.18 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.05 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 26.7 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.00000035 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 8610 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.82 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.16 | 0 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 5.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 5970 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 5.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 154 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.04 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.17 | 0 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.045 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 11.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 16.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.0588 | 1 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.0227 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 19900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 63.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 7.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 21.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 49.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 9.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 854 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 45100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 2120 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 1490 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 1.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 84.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.053 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 51 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 4280 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.0192 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 7060 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 18.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 19.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 416 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 8680 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 1070 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 261 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.34 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.043 | 0 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 1190 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000015 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 79300 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 40.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 20.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 41.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 4.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 1610 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 32300 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 984 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 462 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 41.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 3600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 54000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 60.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 8.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 75.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 55.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 8.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 3060 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 96200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 1070 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 1440 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 45.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 3070 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.0509 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 9520 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 18 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 4.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 23.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 193 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 11800 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 351 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 292 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.18 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 4.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 16.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 603 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.197 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 9000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 11.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 3.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 19.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 119 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 10400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 509 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 286 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.19 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 2.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.043 | 0 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 14 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 554 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 10200 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 2.5 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 10 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 3.3 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 8880 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.09 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 6520 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 1.1 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 5.7 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 4250 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.059 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 8870 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 10 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 7640 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 137 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 5.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.1 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 21100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 20.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 4.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 18700 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 132 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 9.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.11 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.106 | 1 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.126 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 27300 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 11.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 6.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 11.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 78.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 4.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 1790 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 12300 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 573 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 326 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 24.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.044 | 0 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 12.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 708 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.117 | 1 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.175 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 38600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 29.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 7.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 21.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 616 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 5.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 5100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 16500 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 1450 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 398 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.18 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 31.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 15.4 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 1140 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 10300 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 2.7 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 11 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 3.1 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 8690 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.049 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 13300 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 2.2 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 11.4 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 4.3 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 10600 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.054 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 7760 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 4.4 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 9.7 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 6440 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.079 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 7010 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 1.7 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 6.5 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 1.6 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 4080 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.029 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.00000043 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 9960 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.97 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 1.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 10.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 26.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 7070 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 16.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 233 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.061 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.2 | 0 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.079 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 13.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 64.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| 4,4'-DDD \| PEST | 0.0013 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 12100 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.89 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.45 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 10.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 8.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 8600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 7.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 230 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.091 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.18 | 0 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 16.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 22.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 2.49 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 1.91 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 1.39 | 1 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.388 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 10.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 5050 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 195 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 10.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.099 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 1.77 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 1.59 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 1.11 | 1 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00012 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 4600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 2.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 126 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 28 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 24800 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 372 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 502 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.068 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 8810 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 1.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 8.4 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 6640 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 65.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 4.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.055 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.00005 | 0 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 1.42 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.00014 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.000056 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.229 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000025 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.000022 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 3380 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.85 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.39 | 0 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 0.69 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 1390 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 7.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000014 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000022 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6870 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 7.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 5640 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 110 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 3.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.036 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000013 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000016 | 0 |
| SO \| C/S \| Total Soil \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 5740 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 1.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 5.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 1.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 3520 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 45.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Nickel \| TMET | 2.9 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.03 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 5110 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 1.2 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 4.8 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 1.2 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 3460 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.083 | 1 |
| SO \| N/W \| Total Soil \| Include \| Aluminum \| TMET | 14300 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 2.3 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 11.5 | 1 |
| SO \| N/W \| Total Soil \| Include \| Cobalt \| TMET | 2.8 | 1 |
| SO \| N/W \| Total Soil \| Include \| Iron \| TMET | 8710 | 1 |
| SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 0.18 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 2.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 25 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000088 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.67 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.85 | 1 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 2500 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 1.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 5.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 1.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.000005 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.00001 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.00001 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.000005 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.000005 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000021 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000021 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000021 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000021 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.000021 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 10000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 5.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 22 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 4900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 17 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000037 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.0000074 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000074 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000037 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000037 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 3500 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 4.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 5.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 1.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 16000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 82000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 710 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 23 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 33 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 81 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 14 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 720 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 5400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 22000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 510 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.0000091 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000088 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 3700 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 1800 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 3.1 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.75 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 0.76 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000045 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.000009 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000088 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000045 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000045 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.000018 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 3600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 1800 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 2.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.63 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 0.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000021 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 6400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 20000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 30 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 160 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.3 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 2.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.61 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 8.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 27 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 60 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.88 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000022 | 0 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.25 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 27000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 7100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 770 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 270 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 13 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.6 | 0 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 9.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 19 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 55 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 2400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 11 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000022 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 26000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 710 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 31 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 88 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 1100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 160000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 780 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 30 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 17 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 6700 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000022 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 37000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 14000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 680 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 360 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 24 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 9.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 24 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 140 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 7.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 4200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 950 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 8.5 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 0.91 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 12 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 1 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 12 | 1 |
| SO \| N/W \| Total Soil \| Include \| Arsenic \| TMET | 1.1 | 1 |
| SO \| N/W \| Total Soil \| Include \| Chromium \| TMET | 5.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 14000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 9900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 220 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.27 | 0 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 2.6 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.027 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 13 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 6.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 20 | 1 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.037 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.13 | 1 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.59 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 18000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 14000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 10 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.85 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000044 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 45 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000086 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000044 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000044 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.085 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.13 | 1 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 6600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.9 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 10 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000051 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.00001 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.00001 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000051 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000051 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.54 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 2.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 1.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 1.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.096 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 9100 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 9700 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 7.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 13 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 170 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 9.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 86 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000042 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 25 | 1 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 2.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 7500 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 3000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.99 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 6.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 1.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 96 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 59 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.000007 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000035 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 28 | 1 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 3.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 5600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 2800 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.85 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 5.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 1.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 1600 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 4.3 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 52 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 94 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 28 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 2200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 250000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 3400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 170 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 1700 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 8200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 640 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 19 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 18 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 58 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 11 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 1900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 140000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 520 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 10 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 9.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 330 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.044 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 17000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 8900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 190 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 140 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 2.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 9.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 5.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 39 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 740 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 310 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 5.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000024 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 20000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 310 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 210 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 8.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 3.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 8.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 7.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 58 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 1200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 320 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.00002 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 12000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 8400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 260 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.3 | 0 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.9 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 3.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.24 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 3.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 18 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 26 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.052 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000075 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000038 | 0 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 1.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 9.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.41 | 1 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 1.2 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.87 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.71 | 1 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.54 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 13000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 8200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 31 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.59 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 6.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.9 | 1 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000076 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000038 | 0 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 2.3 | 1 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 16 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.55 | 1 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.31 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.89 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.66 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.54 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 7400 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 39 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.85 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 6.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 13 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 2.5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.0000091 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.0000088 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000046 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 0.000019 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 4200 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 1900 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 5 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.83 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 0.77 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 2.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 0.36 | 1 |
| SO \| C/S \| Total Soil \| Include \| Ethylbenzene \| VOC | 0.0000053 | 0 |
| SO \| C/S \| Total Soil \| Include \| Xylene (total) \| VOC | 0.000011 | 0 |
| SO \| C/S \| Total Soil \| Include \| 2-Hexanone \| VOC | 0.00001 | 0 |
| SO \| C/S \| Total Soil \| Include \| Benzene \| VOC | 0.0000053 | 0 |
| SO \| C/S \| Total Soil \| Include \| 1,1,2-Trichloroethane \| VOC | 0.0000053 | 0 |
| SO \| C/S \| Total Soil \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 9.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(b)fluoranthene \| SVOC | 29 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 23 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)anthracene \| SVOC | 27 | 1 |
| SO \| C/S \| Total Soil \| Include \| Naphthalene \| VOC | 1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 35000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 1000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 1.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 63 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 12 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 12000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 59 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.01 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 980 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 8.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 430 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 160000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 250 | 1 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 6.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 3.4 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 58 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 180 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 15 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.047 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.000017 | 0 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 11000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 20000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 190 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 330 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 4.6 | 1 |
| SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.2 | 0 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 2.8 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.7 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 1.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 17 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 4.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 56 | 1 |
| SO \| C/S \| Total Soil \| Include \| Vanadium \| TMET | 14 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 160 | 1 |
| SO \| C/S \| Total Soil \| Include \| Mercury \| TMET | 0.045 | 1 |
| SO \| C/S \| Total Soil \| Include \| Benzo(a)pyrene \| SVOC | 0.27 | 1 |
| SO \| C/S \| Total Soil \| Include \| Aluminum \| TMET | 13000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Iron \| TMET | 14000 | 1 |
| SO \| C/S \| Total Soil \| Include \| Lead \| TMET | 47 | 1 |
| SO \| C/S \| Total Soil \| Include \| Manganese \| TMET | 280 | 1 |
| SO \| C/S \| Total Soil \| Include \| Silver \| TMET | 0.275 | 0 |
| SO \| C/S \| Total Soil \| Include \| Antimony \| TMET | 0.73 | 1 |
| SO \| C/S \| Total Soil \| Include \| Arsenic \| TMET | 4.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cadmium \| TMET | 0.62 | 1 |
| SO \| C/S \| Total Soil \| Include \| Chromium \| TMET | 17 | 1 |
| SO \| C/S \| Total Soil \| Include \| Cobalt \| TMET | 4.1 | 1 |
| SO \| C/S \| Total Soil \| Include \| Copper \| TMET | 69 | 1 |
| SO \| C/S \| Total Soil \| Include \| Zinc \| TMET | 160 | 1 |
| SO \| C/S \| Total Soil \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000258 | 1 |
| SO \| C/S \| Total Soil \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000225 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 8.5 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 49.6 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 8.1 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 44.4 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 16.8 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 34.5 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 21.3 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 32.6 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 4.5 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 29.2 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 12.9 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 44.4 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 4 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 23.4 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 18.6 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 16.4 | 1 |
| SD \| Upgradient Drainage \| All \| Include \| Arsenic \| TMET | 13.3 | 1 |
| SD \| Upgradient Drainage \| All \| Include \| Chromium \| TMET | 27.5 | 1 |
| SD \| Upgradient Drainage \| All \| Include \| Arsenic \| TMET | 3 | 1 |
| SD \| Upgradient Drainage \| All \| Include \| Chromium \| TMET | 8.6 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 7.8 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 37 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 8.1 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 40 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 6.1 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 31 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 8.5 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 45 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 8.5 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 49 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 7.4 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 38 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 9 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 46 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 7.6 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 37 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 8.1 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 41 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 20 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 59 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 11 | 1 |
| SD \| Downgradient Estuarine \| All \| Include \| Chromium \| TMET | 37 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 5.7 | 0 |
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 9.3 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 1030 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 11 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 7.9 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 525 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 11 | 0 |
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 7 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 228 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 5 | 0 |
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 10.9 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 415 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 6.2 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 9.2 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 380 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 5 | 0 |
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 11.7 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 308 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Antimony \| TMET | 5 | 0 |
| SW \| Downgradient Estuarine \| All \| Include \| Arsenic \| TMET | 10.5 | 1 |
| SW \| Downgradient Estuarine \| All \| Include \| Iron \| TMET | 295 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 202 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 7.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.53 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 42.3 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 868 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 5.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 419 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 2.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 1380 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 6.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 668 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 3.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 2.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 2.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 1.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 2.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 54.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 548 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 68.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 7.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1680 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 2.6 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 2180 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 859 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3040 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.7 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.51 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 34.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 81.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 57.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 21.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.53 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 29600 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 8.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 623 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 0.49 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.7 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 17.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.57 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 216 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 91.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.53 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.7 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 14100 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1810 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 3.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.7 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 80.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 9.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 19.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 1.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 1.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 0.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.7 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.33 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.41 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.32 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 7.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 4.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.33 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.41 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.32 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 64.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 3.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.043 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 2.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 2.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 2.9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 45.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 450 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 48.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 13.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1460 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 3.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 1790 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 524 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2310 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 35.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 94.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 30.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.4 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 544 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.17 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 1.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 1.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 1.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 50.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 389 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 49.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 13.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1220 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 3.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 1490 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 416 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 1900 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 1.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 30 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 77.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 23 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 30.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 539 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 3.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 8.8 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.39 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.64 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.36 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.37 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.44 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.35 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 257 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.7 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 107 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1680 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1050 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 2.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.21 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.33 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.41 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.32 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 38.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.7 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 28.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 7.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.11 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 490 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 9800 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2700 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 1400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 51 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 3.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.32 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.34 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.55 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 61 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 38 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 12000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 6.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 590 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.5 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 36 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 74 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 14 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 18 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 2100 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 49 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 1.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 15 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 38 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 4100 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1600 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 50 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 28 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 1300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 390 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 4800 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 160 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 91 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 5.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 120 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 68 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 37000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 32 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.81 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 1300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 550 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 4500 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 110 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 86 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 5.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 120 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 71 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 32000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 34 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.78 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 14 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 19 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 16 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 21 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 40 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 7.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.32 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 5.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 12 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 1.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 2000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 28 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.53 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 39 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8.6 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.11 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.088 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.19 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 640 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 190 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 130 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.032 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 130 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 17 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.029 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 870 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 280 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 12 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 80 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.22 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 190 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 83 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 10 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 130 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.37 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 120 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 3200 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 150 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 6.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 65 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 41 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 19 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.078 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 120 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 23 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 630 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1100 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 14 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3900 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 53 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.67 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 58 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 45 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 6300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 8.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 29 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 610 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 990 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 14 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3800 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 56 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.62 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 51 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 38 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 6400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 7.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 37 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 24 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.12 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.065 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 30 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 19 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 120 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 7.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 51 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 130 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 53 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 280 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 38 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 9.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 2.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 6.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 14 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.89 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.47 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.19 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 1.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 9800 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 350 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 41 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 11 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 35 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 3.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 6.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 15 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.77 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 1.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 8600 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 36 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 9.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 32 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.72 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 340 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 210 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 25 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 3.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.44 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.11 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.44 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 100 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 82 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 18 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 2.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 150 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 8000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 630 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 27 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 11 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 12000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 3200 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 20 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 3.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 44 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 15 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 6.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 18 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 3200 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 11 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 21 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 2.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 630 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.19 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.08 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 970 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 490 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 3.9 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 4.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.7 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 7300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 3700 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 18 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 20 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 7.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 8200 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 4300 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 21 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 23 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 7.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 12 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.039 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 9.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 430 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 670 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 3.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2500 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 22 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 56 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 72 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 39 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 15000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 220 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 25 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 580 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 540 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 22 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 80 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 110 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 59 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 13000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 190 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 450 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 650 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 3.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2600 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 21 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 60 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 82 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 48 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 15000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 220 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 23 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 2.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 600 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 570 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3500 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 83 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 110 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 57 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 12000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 180 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 3.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 13 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.59 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 240 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 15000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 2400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 6.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 93 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 4.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 18 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.2 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.063 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 55000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 100000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 140 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 4000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 71 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 890 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 5.6 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 33 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 42 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 59 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2900 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.3 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 9100 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 3700 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 10 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 54 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 34 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 7 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.5 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 8.8 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 11 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 11000 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 4400 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 71 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 9.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 42 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.4 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 10 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 9.1 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 10 | 0 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 10 | 0 |
| WG \| Yorktown Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000198 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000199 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.000021 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.000021 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000207 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000205 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000213 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000206 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000198 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000201 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000224 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000216 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000216 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000195 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.000021 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000199 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000205 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000204 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000201 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000207 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000202 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000205 | 1 |
| WG \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.0000198 | 1 |
| WG \| Yorktown Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FUR | 0.00002 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 202 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 7.6 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.53 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 42.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 868 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 5.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 419 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 2.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.2 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 1380 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 6.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 668 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 3.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 2.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 2.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 1.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 2.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 2.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 54.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 548 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 68.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 7.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1680 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 2.6 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 2180 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 859 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3040 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.51 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 34.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 81.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 57.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 21.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.53 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 29600 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 8.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 623 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 0.49 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.7 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 17.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.57 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 216 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.7 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 91.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.53 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 14100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1810 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 3.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.7 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.19 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.27 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.54 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.26 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.76 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 80.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 0.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 0.94 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 9.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.24 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 19.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 1.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.15 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 1.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 0.9 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.7 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.33 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.41 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.32 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 7.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 4.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.33 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.41 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.32 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 64.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 3.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.043 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 0.48 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 2.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 2.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 2.9 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 45.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 450 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 48.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 13.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1460 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 3.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 1790 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 524 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2310 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 35.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 94.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 30.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 544 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.17 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 1.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 1.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 1.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 50.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 389 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 49.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 13.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1220 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 3.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 1490 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 416 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 1900 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 1.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 30 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 77.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 23 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 30.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 25000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 539 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 3.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 8.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.39 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.64 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.36 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.37 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.44 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.35 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 257 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.7 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 107 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1680 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1050 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 2.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.21 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.22 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.29 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.28 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.2 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.29 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| m,p-Xylene \| VOC | 0.42 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| o-Xylene \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.31 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.36 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.37 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.59 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.33 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.34 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.41 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.32 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 38.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.7 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 1.3 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 28.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 2.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 7.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.11 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 2.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 1.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 490 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 9800 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2700 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 1400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 51 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 3.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.32 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.34 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.55 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 61 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 38 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 12000 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 6.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 590 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 36 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 74 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 14 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 18 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 2100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 49 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 1.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 15 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 38 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 4100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1600 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 50 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 28 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 1300 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 390 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 4800 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 160 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 91 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 5.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 120 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 68 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 37000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 32 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.81 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 1300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 550 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 4500 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 110 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 86 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 5.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 120 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 71 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 32000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 1300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 34 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 0.78 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 14 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 19 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 16 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 21 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 40 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 7.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.32 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 5.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 12 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 1.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 2000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 28 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.53 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 39 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.11 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.088 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.19 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 640 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 190 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 130 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.032 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 130 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 17 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.029 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 870 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 280 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 12 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 80 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.22 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 190 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 83 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 10 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 130 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.37 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 120 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 3200 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 150 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 6.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 65 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 41 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 19 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.078 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 120 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 23 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 3.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 630 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 1100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 14 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3900 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 53 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.67 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 58 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 45 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 6300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 8.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 29 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 610 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 990 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 14 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3800 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 56 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.62 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 51 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 38 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 6400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 7.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 37 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 24 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.12 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.065 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 30 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 19 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 120 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 7.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 51 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 80000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 130 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 53 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 280 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 38 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 9.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 2.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 6.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 14 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.89 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.47 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.19 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 1.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 9800 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 350 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 41 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 11 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 35 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 3.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 6.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 15 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.77 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 1.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 8600 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 36 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 9.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 32 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.72 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 340 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 210 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 2.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 25 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 3.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.44 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.11 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.44 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 82 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 18 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 2.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 150 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 8000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 630 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 27 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 11 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 12000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 3200 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 20 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 3.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 44 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 15 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 6.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 18 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 3200 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 1400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 11 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 21 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 2.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 630 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.19 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.08 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 970 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 490 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 3.9 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 4.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 4.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 7300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 3700 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 18 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 20 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 7.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 8200 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 4300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 21 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 23 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 7.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 12 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.039 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 9.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 430 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 670 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 3.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2500 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 22 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 56 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 72 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 39 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 15000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 220 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 4.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 25 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 1.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 580 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 540 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 22 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 80 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 110 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 59 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 13000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 190 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 0.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 450 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 650 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 3.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 2600 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 21 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 60 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 2.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 82 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 48 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 15000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 220 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 5.7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 23 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 2.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 600 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 570 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 3500 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 83 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 110 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 57 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 3.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 200000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 12000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 5.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 180 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 3.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 10000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.59 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 240 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 15000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 2400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 6.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 93 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 4.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 18 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.2 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.063 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 55000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 100000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 140 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 4000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 71 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 890 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 5.6 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 33 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 42 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 59 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 2900 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.3 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 9100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 3700 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 54 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 34 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 7 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.5 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 8.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 11 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Ethylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Toluene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Tetrachloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Xylene (total) \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,2-Dichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Isopropylbenzene \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzofuran \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(b)fluoranthene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 2-Methylnaphthalene \| SVOC | 0.1 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Aluminum \| TMET | 11000 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Iron \| TMET | 4400 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Lead \| TMET | 9000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Manganese \| TMET | 71 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 9.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Barium \| TMET | 42 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Beryllium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2500 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 1.4 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 10 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Zinc \| TMET | 9.1 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 100 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5000 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000199 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.000021 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.000021 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000207 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000205 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000213 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000206 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000198 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000201 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000224 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000216 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000216 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000195 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.000021 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000199 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000205 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000204 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000201 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000207 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000202 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000205 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Total TEQ (WHO 2005) ND = 0.5 \| DIOX/FU | 0.0000198 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.85 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.85 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.85 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 216 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.85 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.85 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 158 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 128 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 440 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 420 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 290 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 490 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 360 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 180 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 330 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 190 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 330 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Cyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 180 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.5 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 110 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 105 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.18 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 300 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 170 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 110 | 1 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 100 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 1.8 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 440 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 330 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 12 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 13 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 99 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 200 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 110 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 210 | 1 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| WG-VI \| Surficial Aquifer \| Site-Wide \| Include \| Methylcyclohexane \| VOC | 0.8 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.042 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.048 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.048 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 0.034 | 1 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.6 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.3 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.6 | 0 |
| DSA-SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 1.2 | 0 |
| DSA-SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 1.2 | 0 |
| DSA-SO \| N/W \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.65 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.8 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.35 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.5 | 0 |
| DSA-SO \| C/S \| Total Soil \| Include \| Thallium \| TMET | 1.4 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.28 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.26 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.16 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.26 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.5 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.18 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.15 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.15 | 1 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 4.1 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 3.1 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 2.4 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 3.4 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 3.9 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 3.3 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 4.4 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 2.5 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 3 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 3.8 | 0 |
| DSA-SD \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 4.6 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.68 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.64 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.45 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.88 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0039 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.003 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.002 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0028 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0019 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0057 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.003 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0017 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.11 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.55 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.5 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.38 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.85 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.82 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.74 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.7 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.49 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.74 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.6 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.55 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.53 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.96 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.34 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.14 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.18 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.87 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.42 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.0026 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0024 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0017 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0049 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.35 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.78 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.75 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.68 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.64 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.45 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.88 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0035 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.0027 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.0018 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0025 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0017 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0051 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.0027 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.098 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.49 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.83 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 2.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 2.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.41 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.42 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.68 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.68 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.61 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.99 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.64 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.63 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.76 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.62 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.33 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.35 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.54 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0037 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.0029 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.0019 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0027 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0018 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0054 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.0028 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0016 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 2.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.85 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 2.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 2.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.42 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.43 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.7 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.5 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.7 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.62 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.66 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.64 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.78 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.63 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.21 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.33 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.36 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.55 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0037 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.0029 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.0019 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0027 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0018 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0054 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.0028 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0016 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 2.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.83 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 2.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 2.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.41 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.42 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.68 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.48 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.68 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.61 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.99 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.64 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.63 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.76 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.62 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.33 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.35 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.54 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0036 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.0028 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.0019 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0026 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0018 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0053 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.0028 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0016 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.51 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 2.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.81 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2-Nitrophenol \| SVOC | 2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Pentachlorophenol \| SVOC | 2.1 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)anthracene \| SVOC | 0.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(a)pyrene \| SVOC | 0.41 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(b)fluoranthene \| SVOC | 0.66 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Benzo(k)fluoranthene \| SVOC | 0.47 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Butyl benzyl phthalate \| SVOC | 0.67 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Chrysene \| SVOC | 0.28 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.6 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.97 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.63 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.61 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| bis(2-Ethylhexyl)phthalate \| SVOC | 0.74 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobenzene \| SVOC | 0.6 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachlorobutadiene \| VOC | 0.2 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Hexachloroethane \| SVOC | 0.32 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.34 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.53 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aldrin \| PEST | 0.0037 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| alpha-BHC \| PEST | 0.0029 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Dieldrin \| PEST | 0.0019 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDD \| PEST | 0.0027 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDE \| PEST | 0.0018 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| 4,4'-DDT \| PEST | 0.0054 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor \| PEST | 0.0028 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Heptachlor epoxide \| PEST | 0.0016 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Toxaphene \| PEST | 0.1 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Aroclor 1221 \| PCB | 0.52 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Thallium \| TMET | 2.4 | 0 |
| DSA-SW \| Downgradient Estuarine \| All \| Include \| Cyanide \| CYANIDE | 10000 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.34 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 0.94 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.49 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.35 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.71 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 3 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.34 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 0.94 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.49 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.35 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.71 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 3.5 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.34 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.17 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 0.94 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.49 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.35 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.71 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 2.2 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 3.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 3.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 1.9 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 2.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 4.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 1.7 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 2.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 1.7 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 9.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 4.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 4.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.35 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.71 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 2 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.34 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 0.94 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.49 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.35 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.71 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 4.8 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.34 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.45 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 0.94 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.49 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.35 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.67 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 0.97 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.48 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.79 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.71 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.38 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 3.7 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.32 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.72 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 0.84 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.53 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.86 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.56 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.42 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 6.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.32 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.72 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 0.84 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.53 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.86 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.56 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.3 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.42 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 6.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 1.7 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 5.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 2.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 1.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 5.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 2.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 2.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 2.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.72 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 0.84 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.53 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.86 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.56 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.54 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.42 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 6.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.87 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 2.7 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 5.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.94 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 2.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 1.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.74 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 6.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 1.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 1.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 1.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.72 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 0.84 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.53 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.86 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.56 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.42 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 6.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.32 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.78 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 0.92 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 2.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.43 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.58 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.93 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.61 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.59 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.58 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.31 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.33 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.46 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.51 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0037 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0019 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0028 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0016 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.52 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.43 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.13 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 6.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.22 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.19 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.52 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.24 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.32 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.29 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 0.72 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 1.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 0.84 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.9 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 1.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.53 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 0.86 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 0.56 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 1.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.54 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 0.41 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.28 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.3 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.42 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aldrin \| PEST | 0.0033 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dieldrin \| PEST | 0.0017 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor \| PEST | 0.0026 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Heptachlor epoxide \| PEST | 0.0015 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Toxaphene \| PEST | 0.094 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1221 \| PCB | 0.47 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1232 \| PCB | 0.39 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1242 \| PCB | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1248 \| PCB | 0.15 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1254 \| PCB | 0.11 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Aroclor 1260 \| PCB | 0.12 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 6.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 1.1 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Cyanide \| CYANIDE | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.13 | 1 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.88 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.18 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1.1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.88 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.6 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.7 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.88 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.44 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibromochloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromoform \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dichloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Indeno(1,2,3-cd)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2,4,6-Trichlorophenol \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Silver \| TMET | 10 | 0 |
| DSA-WG \| Surficial Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 10 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| cis-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| trans-1,3-Dichloropropene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,4-Dichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2-Dibromoethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2-Dichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2,4-Trichlorobenzene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Carbon tetrachloride \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2-Hexanone \| VOC | 4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Chloroform \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Bromomethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Vinyl chloride \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Bromodichloromethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1,2-Trichloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Trichloroethene \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1,2,2-Tetrachloroethane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,2-Dibromo-3-chloropropane \| VOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4-Nitrophenol \| SVOC | 2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4-Chloroaniline \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| bis(2-Chloroethyl)ether \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorobenzene \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2,4-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Atrazine \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzo(a)pyrene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Dibenzo(a,h)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 4,6-Dinitro-o-cresol \| SVOC | 4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Benzo(a)anthracene \| SVOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2,6-Dinitrotoluene \| SVOC | 1 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| N-Nitroso-di-n-propylamine \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachloroethane \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorocyclopentadiene \| SVOC | 3.2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Hexachlorobutadiene \| VOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Pentachlorophenol \| SVOC | 1.5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 2-Nitrophenol \| SVOC | 0.8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Naphthalene \| VOC | 0.16 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 3,3'-Dichlorobenzidine \| SVOC | 2 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| 1,1'-Biphenyl \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Nitrobenzene \| SVOC | 0.4 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Thallium \| TMET | 25 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Antimony \| TMET | 15 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Arsenic \| TMET | 8 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Cadmium \| TMET | 2.5 | 0 |

Table A3-13
ProUCL 5.1 Input
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| GroupVar | Conc | D_Conc |
|---|---|---|
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Chromium \| TMET | 5 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Cobalt \| TMET | 13 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Vanadium \| TMET | 25 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Selenium \| TMET | 17 | 0 |
| DSA-WG \| Yorktown Aquifer \| Site-Wide \| Include \| Mercury \| TMET | 0.1 | 0 |

Table A3-14
ProUCL 5.1 Output
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

UCL Statistics for Data Sets with Non-Detects

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.112/9/2020 3:56:09 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (so | c/s | surface soil | include | 4,4'-ddd | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 10 | Number of Distinct Observations | 10 |
| Number of Detects | 7 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.0013 | Minimum Non-Detect | 3.5000E-7 |
| Maximum Detect | 0.197 | Maximum Non-Detect | 4.3000E-7 |
| Variance Detects | 0.00645 | Percent Non-Detects | 30% |
| Mean Detects | 0.0846 | SD Detects | 0.0803 |
| Median Detects | 0.0509 | CV Detects | 0.95 |
| Skewness Detects | 0.495 | Kurtosis Detects | -1.903 |
| Mean of Logged Detects | -3.257 | SD of Logged Detects | 1.765 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.872 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.234 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0592 | KM Standard Error of Mean | 0.025 |
| KM SD | 0.0733 | 95% KM (BCA) UCL | 0.1 |
| 95% KM (t) UCL | 0.105 | 95% KM (Percentile Bootstrap) UCL | 0.0986 |
| 95% KM (z) UCL | 0.1 | 95% KM Bootstrap t UCL | 0.125 |
| 90% KM Chebyshev UCL | 0.134 | 95% KM Chebyshev UCL | 0.168 |
| 97.5% KM Chebyshev UCL | 0.216 | 99% KM Chebyshev UCL | 0.308 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.305 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.736 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.201 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.323 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.759 | k star (bias corrected MLE) | 0.529 |
| Theta hat (MLE) | 0.111 | Theta star (bias corrected MLE) | 0.16 |
| nu hat (MLE) | 10.63 | nu star (bias corrected) | 7.407 |
| Mean (detects) | 0.0846 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.0013 | Mean | 0.0622 |
| Maximum | 0.197 | Median | 0.021 |
| SD | 0.0748 | CV | 1.203 |
| k hat (MLE) | 0.685 | k star (bias corrected MLE) | 0.546 |
| Theta hat (MLE) | 0.0908 | Theta star (bias corrected MLE) | 0.114 |
| nu hat (MLE) | 13.71 | nu star (bias corrected) | 10.93 |
| Adjusted Level of Significance (β) | 0.0267 | | |
| Approximate Chi Square Value (10.93, α) | 4.53 | Adjusted Chi Square Value (10.93, β) | 3.84 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.15 | 95% Gamma Adjusted UCL (use when n<50) | 0.177 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0592 | SD (KM) | 0.0733 |
| Variance (KM) | 0.00537 | SE of Mean (KM) | 0.025 |
| k hat (KM) | 0.653 | k star (KM) | 0.523 |
| nu hat (KM) | 13.05 | nu star (KM) | 10.47 |
| theta hat (KM) | 0.0907 | theta star (KM) | 0.113 |
| 80% gamma percentile (KM) | 0.0974 | 90% gamma percentile (KM) | 0.159 |
| 95% gamma percentile (KM) | 0.224 | 99% gamma percentile (KM) | 0.383 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (10.47, α) | 4.237 | Adjusted Chi Square Value (10.47, β) | 3.574 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.146 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.173 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.873 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.204 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.0594 | Mean in Log Scale | -4.472 |
| SD in Original Scale | 0.0771 | SD in Log Scale | 2.429 |
| 95% t UCL (assumes normality of ROS data) | 0.104 | 95% Percentile Bootstrap UCL | 0.102 |
| 95% BCA Bootstrap UCL | 0.105 | 95% Bootstrap t UCL | 0.126 |
| 95% H-UCL (Log ROS) | 40.27 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -6.74 | KM Geo Mean | 0.00118 |
| KM SD (logged) | 5.492 | 95% Critical H Value (KM-Log) | 14.16 |
| KM Standard Error of Mean (logged) | 1.876 | 95% H-UCL (KM -Log) | 7.627E+14 |

| | | | |
|---|---|---|---|
| KM SD (logged) | 5.492 | 95% Critical H Value (KM-Log) | 14.16 |
| KM Standard Error of Mean (logged) | 1.876 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.0592 | Mean in Log Scale | -6.919 |
| SD in Original Scale | 0.0773 | SD in Log Scale | 6.069 |
| 95% t UCL (Assumes normality) | 0.104 | 95% H-Stat UCL | 5.303E+18 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.105

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | aluminum | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 22 |
| | | Number of Missing Observations | 0 |
| Minimum | 4600 | Mean | 12542 |
| Maximum | 38600 | Median | 9000 |
| SD | 8511 | Std. Error of Mean | 1775 |
| Coefficient of Variation | 0.679 | Skewness | 1.85 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.753 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.303 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 15589 | 95% Adjusted-CLT UCL (Chen-1995) | 16192 |
| | | 95% Modified-t UCL (Johnson-1978) | 15703 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 1.346 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.75 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.234 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.183 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 3.229 | k star (bias corrected MLE) | 2.837 |
| Theta hat (MLE) | 3884 | Theta star (bias corrected MLE) | 4421 |
| nu hat (MLE) | 148.5 | nu star (bias corrected) | 130.5 |
| MLE Mean (bias corrected) | 12542 | MLE Sd (bias corrected) | 7446 |
| | | Approximate Chi Square Value (0.05) | 105.1 |
| Adjusted Level of Significance | 0.0389 | Adjusted Chi Square Value | 103.5 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 15571 | 95% Adjusted Gamma UCL (use when n<50) | 15819 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.912 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.191 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.18 | Data Not Lognormal at 5% Significance Level | |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.434 | Mean of logged Data | 9.274 |
| Maximum of Logged Data | 10.56 | SD of logged Data | 0.547 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 15649 | 90% Chebyshev (MVUE) UCL | 16680 |
| 95% Chebyshev (MVUE) UCL | 18671 | 97.5% Chebyshev (MVUE) UCL | 21435 |
| 99% Chebyshev (MVUE) UCL | 26863 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 15461 | 95% Jackknife UCL | 15589 |
| 95% Standard Bootstrap UCL | 15404 | 95% Bootstrap-t UCL | 17044 |
| 95% Hall's Bootstrap UCL | 16465 | 95% Percentile Bootstrap UCL | 15454 |
| 95% BCA Bootstrap UCL | 16466 | | |
| 90% Chebyshev(Mean, Sd) UCL | 17866 | 95% Chebyshev(Mean, Sd) UCL | 20277 |
| 97.5% Chebyshev(Mean, Sd) UCL | 23624 | 99% Chebyshev(Mean, Sd) UCL | 30199 |

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 20277

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | antimony | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| Number of Detects | 9 | Number of Non-Detects | 5 |
| Number of Distinct Detects | 9 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 2.8 | Minimum Non-Detect | 0.82 |

| | | | |
|---|---|---|---|
| Maximum Detect | 63.7 | Maximum Non-Detect | 0.97 |
| Variance Detects | 340.6 | Percent Non-Detects | 35.71% |
| Mean Detects | 19.1 | SD Detects | 18.46 |
| Median Detects | 11.3 | CV Detects | 0.966 |
| Skewness Detects | 2.093 | Kurtosis Detects | 4.84 |
| Mean of Logged Detects | 2.604 | SD of Logged Detects | 0.889 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.764 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.284 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 12.57 | KM Standard Error of Mean | 4.67 |
| KM SD | 16.47 | 95% KM (BCA) UCL | 20.74 |
| 95% KM (t) UCL | 20.84 | 95% KM (Percentile Bootstrap) UCL | 20.29 |
| 95% KM (z) UCL | 20.25 | 95% KM Bootstrap t UCL | 27.64 |
| 90% KM Chebyshev UCL | 26.58 | 95% KM Chebyshev UCL | 32.93 |
| 97.5% KM Chebyshev UCL | 41.73 | 99% KM Chebyshev UCL | 59.03 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.311 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.734 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.186 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.284 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.591 | k star (bias corrected MLE) | 1.135 |
| Theta hat (MLE) | 12 | Theta star (bias corrected MLE) | 16.83 |
| nu hat (MLE) | 28.65 | nu star (bias corrected) | 20.43 |
| Mean (detects) | 19.1 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 12.28 |
| Maximum | 63.7 | Median | 8.35 |
| SD | 17.31 | CV | 1.41 |
| k hat (MLE) | 0.281 | k star (bias corrected MLE) | 0.269 |
| Theta hat (MLE) | 43.69 | Theta star (bias corrected MLE) | 45.74 |
| nu hat (MLE) | 7.871 | nu star (bias corrected) | 7.518 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (7.52, α) | 2.459 | Adjusted Chi Square Value (7.52, β) | 2.093 |
| 95% Gamma Approximate UCL (use when n>=50) | 37.55 | 95% Gamma Adjusted UCL (use when n<50) | 44.12 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 12.57 | SD (KM) | 16.47 |
| Variance (KM) | 271.4 | SE of Mean (KM) | 4.67 |
| k hat (KM) | 0.582 | k star (KM) | 0.505 |
| nu hat (KM) | 16.31 | nu star (KM) | 14.15 |
| theta hat (KM) | 21.59 | theta star (KM) | 24.88 |
| 80% gamma percentile (KM) | 20.66 | 90% gamma percentile (KM) | 33.94 |
| 95% gamma percentile (KM) | 48.11 | 99% gamma percentile (KM) | 82.94 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (14.15, α) | 6.671 | Adjusted Chi Square Value (14.15, β) | 6.002 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 26.66 | 95% Gamma Adjusted KM-UCL (use when n<50) | 29.63 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.979 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.141 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 12.81 | Mean in Log Scale | 1.813 |
| SD in Original Scale | 16.92 | SD in Log Scale | 1.303 |
| 95% t UCL (assumes normality of ROS data) | 20.82 | 95% Percentile Bootstrap UCL | 20.13 |
| 95% BCA Bootstrap UCL | 23.59 | 95% Bootstrap t UCL | 29.87 |
| 95% H-UCL (Log ROS) | 47.56 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.603 | KM Geo Mean | 4.968 |
| KM SD (logged) | 1.501 | 95% Critical H Value (KM-Log) | 3.694 |
| KM Standard Error of Mean (logged) | 0.426 | 95% H-UCL (KM -Log) | 71.4 |
| KM SD (logged) | 1.501 | 95% Critical H Value (KM-Log) | 3.694 |
| KM Standard Error of Mean (logged) | 0.426 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 12.44 | Mean in Log Scale | 1.382 |
| SD in Original Scale | 17.2 | SD in Log Scale | 1.838 |
| 95% t UCL (Assumes normality) | 20.58 | 95% H-Stat UCL | 198.3 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% KM Adjusted Gamma UCL | 29.63 | 95% GROS Adjusted Gamma UCL | 44.12 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 17 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.7 | Mean | 4.317 |
| Maximum | 8.4 | Median | 3.9 |
| SD | 1.924 | Std. Error of Mean | 0.401 |
| Coefficient of Variation | 0.446 | Skewness | 0.694 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.924 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.144 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 5.006 | 95% Adjusted-CLT UCL (Chen-1995) | 5.039 |
| | | 95% Modified-t UCL (Johnson-1978) | 5.016 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.343 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.746 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.097 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.182 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 5.305 | k star (bias corrected MLE) | 4.642 |
| Theta hat (MLE) | 0.814 | Theta star (bias corrected MLE) | 0.93 |
| nu hat (MLE) | 244 | nu star (bias corrected) | 213.5 |
| MLE Mean (bias corrected) | 4.317 | MLE Sd (bias corrected) | 2.004 |
| | | Approximate Chi Square Value (0.05) | 180.7 |
| Adjusted Level of Significance | 0.0389 | Adjusted Chi Square Value | 178.5 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 5.101 | 95% Adjusted Gamma UCL (use when n<50) | 5.164 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.953 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.107 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.531 | Mean of logged Data | 1.365 |
| Maximum of Logged Data | 2.128 | SD of logged Data | 0.46 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 5.265 | 90% Chebyshev (MVUE) UCL | 5.62 |
| 95% Chebyshev (MVUE) UCL | 6.203 | 97.5% Chebyshev (MVUE) UCL | 7.012 |
| 99% Chebyshev (MVUE) UCL | 8.602 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 4.977 | 95% Jackknife UCL | 5.006 |
| 95% Standard Bootstrap UCL | 4.952 | 95% Bootstrap-t UCL | 5.106 |
| 95% Hall's Bootstrap UCL | 5.086 | 95% Percentile Bootstrap UCL | 4.983 |
| 95% BCA Bootstrap UCL | 5.03 | | |
| 90% Chebyshev(Mean, Sd) UCL | 5.521 | 95% Chebyshev(Mean, Sd) UCL | 6.066 |
| 97.5% Chebyshev(Mean, Sd) UCL | 6.823 | 99% Chebyshev(Mean, Sd) UCL | 8.309 |

Suggested UCL to Use

95% Student's-t UCL 5.006

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | benzo(a)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 6 |
| Number of Detects | 2 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 1.77 | Minimum Non-Detect | 1.7000E-5 |
| Maximum Detect | 2.49 | Maximum Non-Detect | 2.0000E-5 |
| Variance Detects | 0.259 | Percent Non-Detects | 77.78% |
| Mean Detects | 2.13 | SD Detects | 0.509 |
| Median Detects | 2.13 | CV Detects | 0.239 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 0.742 | SD of Logged Detects | 0.241 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.473 | KM Standard Error of Mean | 0.425 |
| KM SD | 0.902 | 95% KM (BCA) UCL | N/A |

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 1.264 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 1.172 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 1.748 | 95% KM Chebyshev UCL | 2.326 |
| 97.5% KM Chebyshev UCL | 3.128 | 99% KM Chebyshev UCL | 4.702 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 34.67 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0614 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 138.7 | nu star (bias corrected) | N/A |
| Mean (detects) | 2.13 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.473 | SD (KM) | 0.902 |
| Variance (KM) | 0.813 | SE of Mean (KM) | 0.425 |
| k hat (KM) | 0.276 | k star (KM) | 0.258 |
| nu hat (KM) | 4.961 | nu star (KM) | 4.641 |
| theta hat (KM) | 1.717 | theta star (KM) | 1.836 |
| 80% gamma percentile (KM) | 0.695 | 90% gamma percentile (KM) | 1.417 |
| 95% gamma percentile (KM) | 2.27 | 99% gamma percentile (KM) | 4.53 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0231 |
| Approximate Chi Square Value (4.64, α) | 0.99 | Adjusted Chi Square Value (4.64, β) | 0.686 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 2.219 | 95% Gamma Adjusted KM-UCL (use when n<50) | 3.203 |

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.931 | Mean in Log Scale | -0.279 |
| SD in Original Scale | 0.72 | SD in Log Scale | 0.645 |
| 95% t UCL (assumes normality of ROS data) | 1.378 | 95% Percentile Bootstrap UCL | 1.353 |
| 95% BCA Bootstrap UCL | 1.445 | 95% Bootstrap t UCL | 2.417 |
| 95% H-UCL (Log ROS) | 1.656 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -8.377 | KM Geo Mean | 2.3010E-4 |
| KM SD (logged) | 4.875 | 95% Critical H Value (KM-Log) | 13.39 |
| KM Standard Error of Mean (logged) | 2.298 | 95% H-UCL (KM -Log) | 3.515E+11 |
| KM SD (logged) | 4.875 | 95% Critical H Value (KM-Log) | 13.39 |
| KM Standard Error of Mean (logged) | 2.298 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.473 | Mean in Log Scale | -8.867 |
| SD in Original Scale | 0.956 | SD in Log Scale | 5.448 |
| 95% t UCL (Assumes normality) | 1.066 | 95% H-Stat UCL | 1.247E+15 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 1.264 | KM H-UCL | 3.515E+11 |
| 95% KM (BCA) UCL | N/A | | |

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | benzo(a)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 13 |
| Number of Detects | 6 | Number of Non-Detects | 17 |
| Number of Distinct Detects | 6 | Number of Distinct Non-Detects | 7 |
| Minimum Detect | 0.01 | Minimum Non-Detect | 1.2000E-5 |
| Maximum Detect | 1.91 | Maximum Non-Detect | 2.2000E-5 |
| Variance Detects | 0.762 | Percent Non-Detects | 73.91% |
| Mean Detects | 0.632 | SD Detects | 0.873 |
| Median Detects | 0.112 | CV Detects | 1.381 |
| Skewness Detects | 1.018 | Kurtosis Detects | -1.527 |
| Mean of Logged Detects | -1.786 | SD of Logged Detects | 2.018 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.717 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.788 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.389 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.325 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.165 | KM Standard Error of Mean | 0.113 |
| KM SD | 0.493 | 95% KM (BCA) UCL | 0.347 |
| 95% KM (t) UCL | 0.358 | 95% KM (Percentile Bootstrap) UCL | 0.351 |
| 95% KM (z) UCL | 0.35 | 95% KM Bootstrap t UCL | 2.202 |
| 90% KM Chebyshev UCL | 0.502 | 95% KM Chebyshev UCL | 0.655 |
| 97.5% KM Chebyshev UCL | 0.867 | 99% KM Chebyshev UCL | 1.284 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.539 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.739 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.324 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.349 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.481 | k star (bias corrected MLE) | 0.352 |
| Theta hat (MLE) | 1.313 | Theta star (bias corrected MLE) | 1.796 |

| | | | |
|---|---|---|---|
| nu hat (MLE) | 5.776 | nu star (bias corrected) | 4.221 |
| Mean (detects) | 0.632 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.172 |
| Maximum | 1.91 | Median | 0.01 |
| SD | 0.501 | CV | 2.909 |
| k hat (MLE) | 0.323 | k star (bias corrected MLE) | 0.31 |
| Theta hat (MLE) | 0.534 | Theta star (bias corrected MLE) | 0.556 |
| nu hat (MLE) | 14.85 | nu star (bias corrected) | 14.24 |
| Adjusted Level of Significance (β) | 0.0389 | | |
| Approximate Chi Square Value (14.24, α) | 6.739 | Adjusted Chi Square Value (14.24, β) | 6.367 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.364 | 95% Gamma Adjusted UCL (use when n<50) | 0.385 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.165 | SD (KM) | 0.493 |
| Variance (KM) | 0.243 | SE of Mean (KM) | 0.113 |
| k hat (KM) | 0.112 | k star (KM) | 0.126 |
| nu hat (KM) | 5.154 | nu star (KM) | 5.815 |
| theta hat (KM) | 1.471 | theta star (KM) | 1.304 |
| 80% gamma percentile (KM) | 0.153 | 90% gamma percentile (KM) | 0.473 |
| 95% gamma percentile (KM) | 0.934 | 99% gamma percentile (KM) | 2.323 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (5.82, α) | 1.546 | Adjusted Chi Square Value (5.82, β) | 1.393 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.62 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.688 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.913 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.788 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.237 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.325 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.165 | Mean in Log Scale | -7.6 |
| SD in Original Scale | 0.504 | SD in Log Scale | 4.167 |
| 95% t UCL (assumes normality of ROS data) | 0.345 | 95% Percentile Bootstrap UCL | 0.365 |
| 95% BCA Bootstrap UCL | 0.419 | 95% Bootstrap t UCL | 2.738 |
| 95% H-UCL (Log ROS) | 3116 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -8.841 | KM Geo Mean | 1.4471E-4 |
| KM SD (logged) | 4.295 | 95% Critical H Value (KM-Log) | 8.069 |
| KM Standard Error of Mean (logged) | 0.981 | 95% H-UCL (KM -Log) | 2377 |
| KM SD (logged) | 4.295 | 95% Critical H Value (KM-Log) | 8.069 |
| KM Standard Error of Mean (logged) | 0.981 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.165 | Mean in Log Scale | -9.219 |
| SD in Original Scale | 0.504 | SD in Log Scale | 4.618 |
| 95% t UCL (Assumes normality) | 0.345 | 95% H-Stat UCL | 21237 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

ısted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) 0.688

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | benzo(b)fluoranthene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 6 |
| Number of Detects | 2 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 1.11 | Minimum Non-Detect | 1.6000E-5 |
| Maximum Detect | 1.39 | Maximum Non-Detect | 1.9000E-5 |
| Variance Detects | 0.0392 | Percent Non-Detects | 77.78% |
| Mean Detects | 1.25 | SD Detects | 0.198 |
| Median Detects | 1.25 | CV Detects | 0.158 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 0.217 | SD of Logged Detects | 0.159 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.278 | KM Standard Error of Mean | 0.247 |
| KM SD | 0.524 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.737 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.684 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 1.019 | 95% KM Chebyshev UCL | 1.354 |
| 97.5% KM Chebyshev UCL | 1.82 | 99% KM Chebyshev UCL | 2.735 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 79.38 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0157 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 317.5 | nu star (bias corrected) | N/A |
| Mean (detects) | 1.25 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.278 | SD (KM) | 0.524 |
| Variance (KM) | 0.274 | SE of Mean (KM) | 0.247 |
| k hat (KM) | 0.281 | k star (KM) | 0.262 |
| nu hat (KM) | 5.062 | nu star (KM) | 4.708 |
| theta hat (KM) | 0.988 | theta star (KM) | 1.062 |
| 80% gamma percentile (KM) | 0.41 | 90% gamma percentile (KM) | 0.831 |
| 95% gamma percentile (KM) | 1.326 | 99% gamma percentile (KM) | 2.638 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0231 |
| Approximate Chi Square Value (4.71, α) | 1.02 | Adjusted Chi Square Value (4.71, β) | 0.709 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.283 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.845 |

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.692 | Mean in Log Scale | -0.456 |
| SD in Original Scale | 0.337 | SD in Log Scale | 0.425 |
| 95% t UCL (assumes normality of ROS data) | 0.901 | 95% Percentile Bootstrap UCL | 0.879 |
| 95% BCA Bootstrap UCL | 0.92 | 95% Bootstrap t UCL | 1.23 |
| 95% H-UCL (Log ROS) | 0.96 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -8.541 | KM Geo Mean | 1.9534E-4 |
| KM SD (logged) | 4.681 | 95% Critical H Value (KM-Log) | 12.87 |
| KM Standard Error of Mean (logged) | 2.207 | 95% H-UCL (KM -Log) | 1.999E+10 |
| KM SD (logged) | 4.681 | 95% Critical H Value (KM-Log) | 12.87 |
| KM Standard Error of Mean (logged) | 2.207 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.278 | Mean in Log Scale | -9.027 |
| SD in Original Scale | 0.556 | SD in Log Scale | 5.242 |
| 95% t UCL (Assumes normality) | 0.622 | 95% H-Stat UCL | 4.185E+13 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 0.737 | KM H-UCL | 1.999E+10 |
| 95% KM (BCA) UCL | N/A | | |

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | cadmium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| Number of Detects | 13 | Number of Non-Detects | 1 |
| Number of Distinct Detects | 13 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 0.21 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 21.6 | Maximum Non-Detect | 0.16 |
| Variance Detects | 66.63 | Percent Non-Detects | 7.143% |
| Mean Detects | 7.392 | SD Detects | 8.163 |
| Median Detects | 3.9 | CV Detects | 1.104 |
| Skewness Detects | 0.989 | Kurtosis Detects | -0.662 |
| Mean of Logged Detects | 1.115 | SD of Logged Detects | 1.64 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.801 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.245 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.234 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 6.876 | KM Standard Error of Mean | 2.165 |
| KM SD | 7.783 | 95% KM (BCA) UCL | 10.3 |
| 95% KM (t) UCL | 10.71 | 95% KM (Percentile Bootstrap) UCL | 10.43 |
| 95% KM (z) UCL | 10.44 | 95% KM Bootstrap t UCL | 11.95 |
| 90% KM Chebyshev UCL | 13.37 | 95% KM Chebyshev UCL | 16.31 |
| 97.5% KM Chebyshev UCL | 20.4 | 99% KM Chebyshev UCL | 28.42 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.314 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.775 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.134 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.247 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.685 | k star (bias corrected MLE) | 0.578 |
| Theta hat (MLE) | 10.8 | Theta star (bias corrected MLE) | 12.79 |
| nu hat (MLE) | 17.8 | nu star (bias corrected) | 15.02 |
| Mean (detects) | 7.392 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 6.865 |
| Maximum | 21.6 | Median | 3.65 |
| SD | 8.087 | CV | 1.178 |
| k hat (MLE) | 0.518 | k star (bias corrected MLE) | 0.454 |
| Theta hat (MLE) | 13.26 | Theta star (bias corrected MLE) | 15.11 |
| nu hat (MLE) | 14.5 | nu star (bias corrected) | 12.72 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (12.72, α) | 5.708 | Adjusted Chi Square Value (12.72, β) | 5.097 |
| 95% Gamma Approximate UCL (use when n>=50) | 15.3 | 95% Gamma Adjusted UCL (use when n<50) | 17.14 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 6.876 | SD (KM) | 7.783 |
| Variance (KM) | 60.58 | SE of Mean (KM) | 2.165 |
| k hat (KM) | 0.78 | k star (KM) | 0.661 |
| nu hat (KM) | 21.85 | nu star (KM) | 18.5 |
| theta hat (KM) | 8.811 | theta star (KM) | 10.41 |
| 80% gamma percentile (KM) | 11.32 | 90% gamma percentile (KM) | 17.49 |
| 95% gamma percentile (KM) | 23.9 | 99% gamma percentile (KM) | 39.25 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (18.50, α) | 9.755 | Adjusted Chi Square Value (18.50, β) | 8.922 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 13.04 | 95% Gamma Adjusted KM-UCL (use when n<50) | 14.26 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.918 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.142 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 6.868 | Mean in Log Scale | 0.832 |
| SD in Original Scale | 8.084 | SD in Log Scale | 1.897 |
| 95% t UCL (assumes normality of ROS data) | 10.69 | 95% Percentile Bootstrap UCL | 10.46 |
| 95% BCA Bootstrap UCL | 11.18 | 95% Bootstrap t UCL | 11.81 |
| 95% H-UCL (Log ROS) | 145.8 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.904 | KM Geo Mean | 2.47 |
| KM SD (logged) | 1.697 | 95% Critical H Value (KM-Log) | 4.072 |
| KM Standard Error of Mean (logged) | 0.472 | 95% H-UCL (KM -Log) | 70.88 |
| KM SD (logged) | 1.697 | 95% Critical H Value (KM-Log) | 4.072 |
| KM Standard Error of Mean (logged) | 0.472 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 6.87 | Mean in Log Scale | 0.855 |

| | | | |
|---|---|---|---|
| SD in Original Scale | 8.082 | SD in Log Scale | 1.851 |
| 95% t UCL (Assumes normality) | 10.7 | 95% H-Stat UCL | 123.5 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL 11.95 usted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) 14.26

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 22 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.3 | Mean | 51.94 |
| Maximum | 616 | Median | 13.5 |
| SD | 126.4 | Std. Error of Mean | 26.35 |
| Coefficient of Variation | 2.433 | Skewness | 4.409 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.372 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.356 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 97.19 | 95% Adjusted-CLT UCL (Chen-1995) | 121.2 |
| | | 95% Modified-t UCL (Johnson-1978) | 101.2 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.527 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.792 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.285 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.19 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.641 | k star (bias corrected MLE) | 0.587 |
| Theta hat (MLE) | 80.98 | Theta star (bias corrected MLE) | 88.53 |
| nu hat (MLE) | 29.5 | nu star (bias corrected) | 26.99 |
| MLE Mean (bias corrected) | 51.94 | MLE Sd (bias corrected) | 67.81 |
| | | Approximate Chi Square Value (0.05) | 16.14 |
| Adjusted Level of Significance | 0.0389 | Adjusted Chi Square Value | 15.54 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 86.84 | 95% Adjusted Gamma UCL (use when n<50) | 90.23 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.859 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.184 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.668 | Mean of logged Data | 2.996 |
| Maximum of Logged Data | 6.423 | SD of logged Data | 1.138 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 73.77 | 90% Chebyshev (MVUE) UCL | 66.74 |
| 95% Chebyshev (MVUE) UCL | 80.39 | 97.5% Chebyshev (MVUE) UCL | 99.33 |
| 99% Chebyshev (MVUE) UCL | 136.5 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 95.29 | 95% Jackknife UCL | 97.19 |
| 95% Standard Bootstrap UCL | 93.48 | 95% Bootstrap-t UCL | 255.5 |
| 95% Hall's Bootstrap UCL | 247.4 | 95% Percentile Bootstrap UCL | 102 |
| 95% BCA Bootstrap UCL | 133.1 | | |
| 90% Chebyshev(Mean, Sd) UCL | 131 | 95% Chebyshev(Mean, Sd) UCL | 166.8 |
| 97.5% Chebyshev(Mean, Sd) UCL | 216.5 | 99% Chebyshev(Mean, Sd) UCL | 314.2 |

Suggested UCL to Use

| | |
|---|---|
| 95% Chebyshev (Mean, Sd) UCL | 166.8 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | cobalt | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 18 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.5 | Mean | 4.983 |
| Maximum | 28 | Median | 3.2 |
| SD | 5.816 | Std. Error of Mean | 1.213 |
| Coefficient of Variation | 1.167 | Skewness | 3.311 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.529 | Shapiro Wilk GOF Test |

| | | |
|---|---|---|
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.362 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 7.065 | 95% Adjusted-CLT UCL (Chen-1995) | 7.872 |
| | | 95% Modified-t UCL (Johnson-1978) | 7.205 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.377 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.757 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.258 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.184 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.788 | k star (bias corrected MLE) | 1.584 |
| Theta hat (MLE) | 2.787 | Theta star (bias corrected MLE) | 3.146 |
| nu hat (MLE) | 82.24 | nu star (bias corrected) | 72.85 |
| MLE Mean (bias corrected) | 4.983 | MLE Sd (bias corrected) | 3.959 |
| | | Approximate Chi Square Value (0.05) | 54.19 |
| Adjusted Level of Significance | 0.0389 | Adjusted Chi Square Value | 53.03 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 6.698 | 95% Adjusted Gamma UCL (use when n<50) | 6.845 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.831 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.183 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.405 | Mean of logged Data | 1.301 |
| Maximum of Logged Data | 3.332 | SD of logged Data | 0.674 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 6.265 | 90% Chebyshev (MVUE) UCL | 6.603 |
| 95% Chebyshev (MVUE) UCL | 7.531 | 97.5% Chebyshev (MVUE) UCL | 8.819 |
| 99% Chebyshev (MVUE) UCL | 11.35 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 6.978 | 95% Jackknife UCL | 7.065 |
| 95% Standard Bootstrap UCL | 6.887 | 95% Bootstrap-t UCL | 10.73 |
| 95% Hall's Bootstrap UCL | 13.99 | 95% Percentile Bootstrap UCL | 7.135 |
| 95% BCA Bootstrap UCL | 8.248 | | |

| | | | |
|---|---|---|---|
| 90% Chebyshev(Mean, Sd) UCL | 8.621 | 95% Chebyshev(Mean, Sd) UCL | 10.27 |
| 97.5% Chebyshev(Mean, Sd) UCL | 12.56 | 99% Chebyshev(Mean, Sd) UCL | 17.05 |

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 10.27

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | copper | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.3 | Mean | 798.2 |
| Maximum | 5100 | Median | 149.5 |
| SD | 1442 | Std. Error of Mean | 385.5 |
| Coefficient of Variation | 1.807 | Skewness | 2.424 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.627 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.319 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 1481 | 95% Adjusted-CLT UCL (Chen-1995) | 1699 |
| | | 95% Modified-t UCL (Johnson-1978) | 1522 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.519 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.819 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.19 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.246 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.365 | k star (bias corrected MLE) | 0.335 |
| Theta hat (MLE) | 2186 | Theta star (bias corrected MLE) | 2386 |
| nu hat (MLE) | 10.23 | nu star (bias corrected) | 9.367 |
| MLE Mean (bias corrected) | 798.2 | MLE Sd (bias corrected) | 1380 |
| | | Approximate Chi Square Value (0.05) | 3.55 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 3.09 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50) | 2106 | 95% Adjusted Gamma UCL (use when n<50) | 2419 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.95 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.117 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.668 | Mean of logged Data | 4.854 |
| Maximum of Logged Data | 8.537 | SD of logged Data | 2.259 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 42714 | 90% Chebyshev (MVUE) UCL | 3129 |
| 95% Chebyshev (MVUE) UCL | 4077 | 97.5% Chebyshev (MVUE) UCL | 5392 |
| 99% Chebyshev (MVUE) UCL | 7976 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1432 | 95% Jackknife UCL | 1481 |
| 95% Standard Bootstrap UCL | 1402 | 95% Bootstrap-t UCL | 2453 |
| 95% Hall's Bootstrap UCL | 3237 | 95% Percentile Bootstrap UCL | 1465 |
| 95% BCA Bootstrap UCL | 1787 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1955 | 95% Chebyshev(Mean, Sd) UCL | 2478 |
| 97.5% Chebyshev(Mean, Sd) UCL | 3206 | 99% Chebyshev(Mean, Sd) UCL | 4634 |

Suggested UCL to Use

| | |
|---|---|
| 95% Adjusted Gamma UCL | 2419 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | dibenzo(a,h)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 6 |
| Number of Detects | 1 | Number of Non-Detects | 8 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 5 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (so | c/s | surface soil | include | dibenzo(a,h)anthracene | svoc) was not processed!

Conc (so | c/s | surface soil | include | iron | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 23 |
| | | Number of Missing Observations | 0 |
| Minimum | 3520 | Mean | 17927 |
| Maximum | 160000 | Median | 8400 |
| SD | 32278 | Std. Error of Mean | 6730 |
| Coefficient of Variation | 1.801 | Skewness | 4.243 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.41 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.344 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 29484 | 95% Adjusted-CLT UCL (Chen-1995) | 35360 |
| | | 95% Modified-t UCL (Johnson-1978) | 30476 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.491 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.768 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.254 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.186 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.083 | k star (bias corrected MLE) | 0.971 |
| Theta hat (MLE) | 16547 | Theta star (bias corrected MLE) | 18461 |
| nu hat (MLE) | 49.84 | nu star (bias corrected) | 44.67 |
| MLE Mean (bias corrected) | 17927 | MLE Sd (bias corrected) | 18192 |
| | | Approximate Chi Square Value (0.05) | 30.34 |
| Adjusted Level of Significance | 0.0389 | Adjusted Chi Square Value | 29.48 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 26394 | 95% Adjusted Gamma UCL (use when n<50) | 27161 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.842 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.202 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.166 | Mean of logged Data | 9.266 |
| Maximum of Logged Data | 11.98 | SD of logged Data | 0.836 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 22687 | 90% Chebyshev (MVUE) UCL | 23152 |
| 95% Chebyshev (MVUE) UCL | 26978 | 97.5% Chebyshev (MVUE) UCL | 32288 |
| 99% Chebyshev (MVUE) UCL | 42719 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 28997 | 95% Jackknife UCL | 29484 |
| 95% Standard Bootstrap UCL | 28610 | 95% Bootstrap-t UCL | 67009 |
| 95% Hall's Bootstrap UCL | 70182 | 95% Percentile Bootstrap UCL | 30180 |
| 95% BCA Bootstrap UCL | 37209 | | |
| 90% Chebyshev(Mean, Sd) UCL | 38118 | 95% Chebyshev(Mean, Sd) UCL | 47264 |
| 97.5% Chebyshev(Mean, Sd) UCL | 59958 | 99% Chebyshev(Mean, Sd) UCL | 84893 |

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 47264

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | lead | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.4 | Mean | 524.7 |
| Maximum | 2120 | Median | 300.5 |
| SD | 638 | Std. Error of Mean | 170.5 |
| Coefficient of Variation | 1.216 | Skewness | 1.484 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.817 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.208 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data appear Normal at 5% Significance Level |

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 826.6 | 95% Adjusted-CLT UCL (Chen-1995) | 877.4 |
| | | 95% Modified-t UCL (Johnson-1978) | 837.9 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.455 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.793 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.212 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.242 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.499 | k star (bias corrected MLE) | 0.44 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 1052 | Theta star (bias corrected MLE) | 1194 |
| nu hat (MLE) | 13.97 | nu star (bias corrected) | 12.31 |
| MLE Mean (bias corrected) | 524.7 | MLE Sd (bias corrected) | 791.3 |
| | | Approximate Chi Square Value (0.05) | 5.43 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 4.837 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 1189 | 95% Adjusted Gamma UCL (use when n<50) | 1335 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.881 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.2 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.686 | Mean of logged Data | 4.989 |
| Maximum of Logged Data | 7.659 | SD of logged Data | 2.11 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 23911 | 90% Chebyshev (MVUE) UCL | 2705 |
| 95% Chebyshev (MVUE) UCL | 3508 | 97.5% Chebyshev (MVUE) UCL | 4623 |
| 99% Chebyshev (MVUE) UCL | 6813 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 805.1 | 95% Jackknife UCL | 826.6 |
| 95% Standard Bootstrap UCL | 799.6 | 95% Bootstrap-t UCL | 1013 |
| 95% Hall's Bootstrap UCL | 1008 | 95% Percentile Bootstrap UCL | 818 |
| 95% BCA Bootstrap UCL | 870.9 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1036 | 95% Chebyshev(Mean, Sd) UCL | 1268 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1589 | 99% Chebyshev(Mean, Sd) UCL | 2221 |

Suggested UCL to Use

95% Student's-t UCL 826.6

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | manganese | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 23 |

| | | | |
|---|---|---|---|
| | | Number of Missing Observations | 0 |
| Minimum | 40.4 | Mean | 299.4 |
| Maximum | 1490 | Median | 233 |
| SD | 321.3 | Std. Error of Mean | 66.99 |
| Coefficient of Variation | 1.073 | Skewness | 2.896 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.634 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.292 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 414.4 | 95% Adjusted-CLT UCL (Chen-1995) | 452.8 |
| | | 95% Modified-t UCL (Johnson-1978) | 421.1 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.841 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.759 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.175 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.185 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.561 | k star (bias corrected MLE) | 1.386 |
| Theta hat (MLE) | 191.8 | Theta star (bias corrected MLE) | 216 |
| nu hat (MLE) | 71.79 | nu star (bias corrected) | 63.76 |
| MLE Mean (bias corrected) | 299.4 | MLE Sd (bias corrected) | 254.3 |
| | | Approximate Chi Square Value (0.05) | 46.39 |
| Adjusted Level of Significance | 0.0389 | Adjusted Chi Square Value | 45.31 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50) | 411.5 | 95% Adjusted Gamma UCL (use when n<50) | 421.2 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.952 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.136 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 3.699 | Mean of logged Data | 5.348 |
| Maximum of Logged Data | 7.307 | SD of logged Data | 0.837 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 451.4 | 90% Chebyshev (MVUE) UCL | 460.6 |
| 95% Chebyshev (MVUE) UCL | 536.8 | 97.5% Chebyshev (MVUE) UCL | 642.5 |
| 99% Chebyshev (MVUE) UCL | 850.1 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 409.6 | 95% Jackknife UCL | 414.4 |
| 95% Standard Bootstrap UCL | 405.5 | 95% Bootstrap-t UCL | 586.1 |
| 95% Hall's Bootstrap UCL | 1022 | 95% Percentile Bootstrap UCL | 416.8 |
| 95% BCA Bootstrap UCL | 446.2 | | |
| 90% Chebyshev(Mean, Sd) UCL | 500.3 | 95% Chebyshev(Mean, Sd) UCL | 591.4 |
| 97.5% Chebyshev(Mean, Sd) UCL | 717.7 | 99% Chebyshev(Mean, Sd) UCL | 965.9 |

Suggested UCL to Use

95% Adjusted Gamma UCL 421.2

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | mercury | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.04 | Mean | 0.257 |
| Maximum | 1.8 | Median | 0.16 |
| SD | 0.453 | Std. Error of Mean | 0.121 |
| Coefficient of Variation | 1.763 | Skewness | 3.499 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.469 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.363 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 0.471 | 95% Adjusted-CLT UCL (Chen-1995) | 0.577 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.49 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 1.184 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.764 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.249 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.236 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

## Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.897 | k star (bias corrected MLE) | 0.752 |
| Theta hat (MLE) | 0.286 | Theta star (bias corrected MLE) | 0.341 |
| nu hat (MLE) | 25.11 | nu star (bias corrected) | 21.06 |
| MLE Mean (bias corrected) | 0.257 | MLE Sd (bias corrected) | 0.296 |
| | | Approximate Chi Square Value (0.05) | 11.64 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 10.72 |

## Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 0.465 | 95% Adjusted Gamma UCL (use when n<50) | 0.505 |

## Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.888 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.152 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

## Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -3.219 | Mean of logged Data | -2.011 |
| Maximum of Logged Data | 0.588 | SD of logged Data | 1.029 |

## Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 0.511 | 90% Chebyshev (MVUE) UCL | 0.409 |
| 95% Chebyshev (MVUE) UCL | 0.497 | 97.5% Chebyshev (MVUE) UCL | 0.619 |
| 99% Chebyshev (MVUE) UCL | 0.858 | | |

## Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

## Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.456 | 95% Jackknife UCL | 0.471 |
| 95% Standard Bootstrap UCL | 0.449 | 95% Bootstrap-t UCL | 1.138 |
| 95% Hall's Bootstrap UCL | 1.305 | 95% Percentile Bootstrap UCL | 0.496 |
| 95% BCA Bootstrap UCL | 0.615 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.62 | 95% Chebyshev(Mean, Sd) UCL | 0.785 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1.013 | 99% Chebyshev(Mean, Sd) UCL | 1.461 |

## Suggested UCL to Use

| | |
|---|---|
| 95% Chebyshev (Mean, Sd) UCL | 0.785 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | nickel | tmet)

## General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |

| | | | |
|---|---|---|---|
| Minimum | 2.9 | Mean | 60.99 |
| Maximum | 502 | Median | 5.1 |
| SD | 165.4 | Std. Error of Mean | 55.13 |
| Coefficient of Variation | 2.712 | Skewness | 2.999 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

## Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.403 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.509 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

## Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 163.5 | 95% Adjusted-CLT UCL (Chen-1995) | 210.6 |
| | | 95% Modified-t UCL (Johnson-1978) | 172.7 |

## Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.252 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.798 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.479 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.3 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

## Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.35 | k star (bias corrected MLE) | 0.307 |
| Theta hat (MLE) | 174.4 | Theta star (bias corrected MLE) | 198.5 |
| nu hat (MLE) | 6.296 | nu star (bias corrected) | 5.531 |
| MLE Mean (bias corrected) | 60.99 | MLE Sd (bias corrected) | 110 |
| | | Approximate Chi Square Value (0.05) | 1.405 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 1.015 |

## Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 240.1 | 95% Adjusted Gamma UCL (use when n<50) | 332.2 |

## Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.626 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.355 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

## Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.065 | Mean of logged Data | 2.188 |
| Maximum of Logged Data | 6.219 | SD of logged Data | 1.564 |

## Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 386.3 | 90% Chebyshev (MVUE) UCL | 62.74 |
| 95% Chebyshev (MVUE) UCL | 80.27 | 97.5% Chebyshev (MVUE) UCL | 104.6 |
| 99% Chebyshev (MVUE) UCL | 152.4 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 151.7 | 95% Jackknife UCL | 163.5 |
| 95% Standard Bootstrap UCL | 146.1 | 95% Bootstrap-t UCL | 4862 |
| 95% Hall's Bootstrap UCL | 3786 | 95% Percentile Bootstrap UCL | 170.9 |
| 95% BCA Bootstrap UCL | 226.5 | | |
| 90% Chebyshev(Mean, Sd) UCL | 226.4 | 95% Chebyshev(Mean, Sd) UCL | 301.3 |
| 97.5% Chebyshev(Mean, Sd) UCL | 405.3 | 99% Chebyshev(Mean, Sd) UCL | 609.6 |

Suggested UCL to Use

95% Hall's Bootstrap UCL 3786

Recommended UCL exceeds the maximum observation

In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | silver | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 13 |
| Number of Detects | 10 | Number of Non-Detects | 4 |
| Number of Distinct Detects | 10 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.18 | Minimum Non-Detect | 0.17 |
| Maximum Detect | 84.5 | Maximum Non-Detect | 0.3 |
| Variance Detects | 630.8 | Percent Non-Detects | 28.57% |
| Mean Detects | 18.95 | SD Detects | 25.12 |
| Median Detects | 11 | CV Detects | 1.325 |
| Skewness Detects | 2.329 | Kurtosis Detects | 5.965 |
| Mean of Logged Detects | 2.083 | SD of Logged Detects | 1.687 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.715 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.842 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.262 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.262 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 13.58 | KM Standard Error of Mean | 6.156 |
| KM SD | 21.85 | 95% KM (BCA) UCL | 23.77 |
| 95% KM (t) UCL | 24.48 | 95% KM (Percentile Bootstrap) UCL | 24 |

| | | | |
|---|---|---|---|
| 95% KM (z) UCL | 23.71 | 95% KM Bootstrap t UCL | 37.83 |
| 90% KM Chebyshev UCL | 32.05 | 95% KM Chebyshev UCL | 40.42 |
| 97.5% KM Chebyshev UCL | 52.03 | 99% KM Chebyshev UCL | 74.83 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.186 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.761 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.113 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.277 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.703 | k star (bias corrected MLE) | 0.559 |
| Theta hat (MLE) | 26.95 | Theta star (bias corrected MLE) | 33.91 |
| nu hat (MLE) | 14.06 | nu star (bias corrected) | 11.17 |
| Mean (detects) | 18.95 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 13.54 |
| Maximum | 84.5 | Median | 4.45 |
| SD | 22.71 | CV | 1.677 |
| k hat (MLE) | 0.286 | k star (bias corrected MLE) | 0.272 |
| Theta hat (MLE) | 47.4 | Theta star (bias corrected MLE) | 49.76 |
| nu hat (MLE) | 7.997 | nu star (bias corrected) | 7.617 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (7.62, α) | 2.515 | Adjusted Chi Square Value (7.62, β) | 2.144 |
| 95% Gamma Approximate UCL (use when n>=50) | 40.99 | 95% Gamma Adjusted UCL (use when n<50) | 48.1 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 13.58 | SD (KM) | 21.85 |
| Variance (KM) | 477.5 | SE of Mean (KM) | 6.156 |
| k hat (KM) | 0.386 | k star (KM) | 0.351 |
| nu hat (KM) | 10.82 | nu star (KM) | 9.835 |
| theta hat (KM) | 35.15 | theta star (KM) | 38.67 |
| 80% gamma percentile (KM) | 21.52 | 90% gamma percentile (KM) | 39.2 |
| 95% gamma percentile (KM) | 59 | 99% gamma percentile (KM) | 109.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (9.83, α) | 3.839 | Adjusted Chi Square Value (9.83, β) | 3.357 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 34.8 | 95% Gamma Adjusted KM-UCL (use when n<50) | 39.8 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.927 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.842 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.159 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.262 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 13.59 | Mean in Log Scale | 1.023 |
| SD in Original Scale | 22.67 | SD in Log Scale | 2.241 |
| 95% t UCL (assumes normality of ROS data) | 24.32 | 95% Percentile Bootstrap UCL | 24.26 |
| 95% BCA Bootstrap UCL | 29.82 | 95% Bootstrap t UCL | 37.85 |
| 95% H-UCL (Log ROS) | 850.8 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.984 | KM Geo Mean | 2.675 |
| KM SD (logged) | 2.202 | 95% Critical H Value (KM-Log) | 5.083 |
| KM Standard Error of Mean (logged) | 0.62 | 95% H-UCL (KM -Log) | 672.8 |
| KM SD (logged) | 2.202 | 95% Critical H Value (KM-Log) | 5.083 |
| KM Standard Error of Mean (logged) | 0.62 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 13.56 | Mean in Log Scale | 0.839 |
| SD in Original Scale | 22.69 | SD in Log Scale | 2.479 |
| 95% t UCL (Assumes normality) | 24.3 | 95% H-Stat UCL | 2441 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL 37.83 usted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) 39.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 20 |
| Number of Detects | 14 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 14 | Number of Distinct Non-Detects | 7 |
| Minimum Detect | 0.03 | Minimum Non-Detect | 0.043 |
| Maximum Detect | 0.2 | Maximum Non-Detect | 1.6 |
| Variance Detects | 0.00233 | Percent Non-Detects | 39.13% |
| Mean Detects | 0.0799 | SD Detects | 0.0483 |
| Median Detects | 0.0615 | CV Detects | 0.604 |
| Skewness Detects | 1.399 | Kurtosis Detects | 1.737 |
| Mean of Logged Detects | -2.675 | SD of Logged Detects | 0.552 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.861 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.197 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0679 | KM Standard Error of Mean | 0.0107 |
| KM SD | 0.0448 | 95% KM (BCA) UCL | 0.0878 |
| 95% KM (t) UCL | 0.0863 | 95% KM (Percentile Bootstrap) UCL | 0.0863 |
| 95% KM (z) UCL | 0.0855 | 95% KM Bootstrap t UCL | 0.0952 |
| 90% KM Chebyshev UCL | 0.1 | 95% KM Chebyshev UCL | 0.115 |
| 97.5% KM Chebyshev UCL | 0.135 | 99% KM Chebyshev UCL | 0.174 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.363 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.184 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.23 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 3.536 | k star (bias corrected MLE) | 2.826 |
| Theta hat (MLE) | 0.0226 | Theta star (bias corrected MLE) | 0.0283 |
| nu hat (MLE) | 99.02 | nu star (bias corrected) | 79.13 |
| Mean (detects) | 0.0799 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.0622 |
| Maximum | 0.2 | Median | 0.055 |
| SD | 0.0452 | CV | 0.727 |
| k hat (MLE) | 2.17 | k star (bias corrected MLE) | 1.916 |
| Theta hat (MLE) | 0.0287 | Theta star (bias corrected MLE) | 0.0325 |
| nu hat (MLE) | 99.82 | nu star (bias corrected) | 88.14 |
| Adjusted Level of Significance (β) | 0.0389 | | |
| Approximate Chi Square Value (88.14, α) | 67.49 | Adjusted Chi Square Value (88.14, β) | 66.18 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.0812 | 95% Gamma Adjusted UCL (use when n<50) | 0.0828 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0679 | SD (KM) | 0.0448 |
| Variance (KM) | 0.002 | SE of Mean (KM) | 0.0107 |
| k hat (KM) | 2.301 | k star (KM) | 2.03 |
| nu hat (KM) | 105.9 | nu star (KM) | 93.39 |
| theta hat (KM) | 0.0295 | theta star (KM) | 0.0335 |
| 80% gamma percentile (KM) | 0.102 | 90% gamma percentile (KM) | 0.132 |
| 95% gamma percentile (KM) | 0.16 | 99% gamma percentile (KM) | 0.224 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (93.39, α) | 72.11 | Adjusted Chi Square Value (93.39, β) | 70.75 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.088 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.0897 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.966 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.159 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.0648 | Mean in Log Scale | -2.895 |
| SD in Original Scale | 0.0426 | SD in Log Scale | 0.55 |
| 95% t UCL (assumes normality of ROS data) | 0.0801 | 95% Percentile Bootstrap UCL | 0.0803 |
| 95% BCA Bootstrap UCL | 0.0836 | 95% Bootstrap t UCL | 0.0887 |
| 95% H-UCL (Log ROS) | 0.0815 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.86 | KM Geo Mean | 0.0572 |
| KM SD (logged) | 0.557 | 95% Critical H Value (KM-Log) | 2.024 |
| KM Standard Error of Mean (logged) | 0.134 | 95% H-UCL (KM -Log) | 0.085 |
| KM SD (logged) | 0.557 | 95% Critical H Value (KM-Log) | 2.024 |
| KM Standard Error of Mean (logged) | 0.134 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.177 | Mean in Log Scale | -2.516 |
| SD in Original Scale | 0.257 | SD in Log Scale | 1.198 |
| 95% t UCL (Assumes normality) | 0.269 | 95% H-Stat UCL | 0.338 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.0863

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | total teq (who 2005) nd = 0.5 | diox/fur)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 2 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.2500E-5 | Mean | 2.4150E-5 |
| Maximum | 2.5800E-5 | Median | 2.4150E-5 |

Warning: This data set only has 2 observations!

Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (so | c/s | surface soil | include | total teq (who 2005) nd = 0.5 | diox/fur) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (so | c/s | surface soil | include | vanadium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 11 | Mean | 16.5 |
| Maximum | 51 | Median | 14 |
| SD | 10.08 | Std. Error of Mean | 2.695 |
| Coefficient of Variation | 0.611 | Skewness | 3.546 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.46 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.436 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 21.27 | 95% Adjusted-CLT UCL (Chen-1995) | 23.66 |
| | | 95% Modified-t UCL (Johnson-1978) | 21.7 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.301 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.737 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.384 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.229 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 5.731 | k star (bias corrected MLE) | 4.551 |
| Theta hat (MLE) | 2.879 | Theta star (bias corrected MLE) | 3.626 |
| nu hat (MLE) | 160.5 | nu star (bias corrected) | 127.4 |
| MLE Mean (bias corrected) | 16.5 | MLE Sd (bias corrected) | 7.735 |
| | | Approximate Chi Square Value (0.05) | 102.3 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 99.37 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 20.54 | 95% Adjusted Gamma UCL (use when n<50) | 21.16 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.628 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.346 | Lilliefors Lognormal GOF Test |

| | | | |
|---|---|---|---|
| 5% Lilliefors Critical Value | 0.226 | Data Not Lognormal at 5% Significance Level | |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 2.398 | Mean of logged Data | 2.714 |
| Maximum of Logged Data | 3.932 | SD of logged Data | 0.373 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 19.81 | 90% Chebyshev (MVUE) UCL | 20.98 |
| 95% Chebyshev (MVUE) UCL | 23.2 | 97.5% Chebyshev (MVUE) UCL | 26.27 |
| 99% Chebyshev (MVUE) UCL | 32.32 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 20.93 | 95% Jackknife UCL | 21.27 |
| 95% Standard Bootstrap UCL | 20.81 | 95% Bootstrap-t UCL | 35.23 |
| 95% Hall's Bootstrap UCL | 39.96 | 95% Percentile Bootstrap UCL | 21.75 |
| 95% BCA Bootstrap UCL | 24.58 | | |
| 90% Chebyshev(Mean, Sd) UCL | 24.58 | 95% Chebyshev(Mean, Sd) UCL | 28.25 |
| 97.5% Chebyshev(Mean, Sd) UCL | 33.33 | 99% Chebyshev(Mean, Sd) UCL | 43.31 |

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 21.27 | or 95% Modified-t UCL | 21.7 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | surface soil | include | zinc | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 16.4 | Mean | 701.5 |
| Maximum | 4280 | Median | 492 |
| SD | 1106 | Std. Error of Mean | 295.5 |
| Coefficient of Variation | 1.576 | Skewness | 2.943 |

Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.614 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.283 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 1225 | 95% Adjusted-CLT UCL (Chen-1995) | 1436 |

| | |
|---|---|
| 95% Modified-t UCL (Johnson-1978) | 1264 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.5 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.788 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.154 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.241 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.553 | k star (bias corrected MLE) | 0.482 |
| Theta hat (MLE) | 1269 | Theta star (bias corrected MLE) | 1455 |
| nu hat (MLE) | 15.48 | nu star (bias corrected) | 13.5 |
| MLE Mean (bias corrected) | 701.5 | MLE Sd (bias corrected) | 1010 |
| | | Approximate Chi Square Value (0.05) | 6.227 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 5.585 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50) | 1520 | 95% Adjusted Gamma UCL (use when n<50) | 1695 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.906 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.211 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 2.797 | Mean of logged Data | 5.422 |
| Maximum of Logged Data | 8.362 | SD of logged Data | 1.79 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 9303 | 90% Chebyshev (MVUE) UCL | 2334 |
| 95% Chebyshev (MVUE) UCL | 2988 | 97.5% Chebyshev (MVUE) UCL | 3897 |
| 99% Chebyshev (MVUE) UCL | 5682 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1188 | 95% Jackknife UCL | 1225 |
| 95% Standard Bootstrap UCL | 1172 | 95% Bootstrap-t UCL | 1889 |
| 95% Hall's Bootstrap UCL | 3041 | 95% Percentile Bootstrap UCL | 1237 |
| 95% BCA Bootstrap UCL | 1522 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1588 | 95% Chebyshev(Mean, Sd) UCL | 1990 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2547 | 99% Chebyshev(Mean, Sd) UCL | 3642 |

Suggested UCL to Use

| | |
|---|---|
| 95% Adjusted Gamma UCL | 1695 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | n/w | surface soil | include | aluminum | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 5110 | Mean | 9313 |
| Maximum | 14300 | Median | 8980 |
| SD | 3289 | Std. Error of Mean | 1163 |
| Coefficient of Variation | 0.353 | Skewness | 0.413 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.936 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.182 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 11515 | 95% Adjusted-CLT UCL (Chen-1995) | 11407 |
| | | 95% Modified-t UCL (Johnson-1978) | 11544 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.259 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.716 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.164 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.294 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 9.134 | k star (bias corrected MLE) | 5.792 |
| Theta hat (MLE) | 1020 | Theta star (bias corrected MLE) | 1608 |
| nu hat (MLE) | 146.1 | nu star (bias corrected) | 92.67 |
| MLE Mean (bias corrected) | 9313 | MLE Sd (bias corrected) | 3869 |
| | | Approximate Chi Square Value (0.05) | 71.47 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 66.78 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 12075 | 95% Adjusted Gamma UCL (use when n<50) | 12924 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.956 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |

| | | | |
|---|---|---|---|
| Lilliefors Test Statistic | 0.158 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.539 | Mean of logged Data | 9.083 |
| Maximum of Logged Data | 9.568 | SD of logged Data | 0.36 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 12565 | 90% Chebyshev (MVUE) UCL | 12892 |
| 95% Chebyshev (MVUE) UCL | 14512 | 97.5% Chebyshev (MVUE) UCL | 16760 |
| 99% Chebyshev (MVUE) UCL | 21175 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 11225 | 95% Jackknife UCL | 11515 |
| 95% Standard Bootstrap UCL | 11057 | 95% Bootstrap-t UCL | 11531 |
| 95% Hall's Bootstrap UCL | 11795 | 95% Percentile Bootstrap UCL | 11154 |
| 95% BCA Bootstrap UCL | 11239 | | |
| 90% Chebyshev(Mean, Sd) UCL | 12801 | 95% Chebyshev(Mean, Sd) UCL | 14381 |
| 97.5% Chebyshev(Mean, Sd) UCL | 16574 | 99% Chebyshev(Mean, Sd) UCL | 20882 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 11515 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | n/w | surface soil | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.1 | Mean | 2.263 |
| Maximum | 4.4 | Median | 2.25 |
| SD | 1.043 | Std. Error of Mean | 0.369 |
| Coefficient of Variation | 0.461 | Skewness | 1.16 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.899 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.212 | Lilliefors GOF Test | |

| | | |
|---|---|---|
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 2.961 | 95% Adjusted-CLT UCL (Chen-1995) | 3.031 |
| | | 95% Modified-t UCL (Johnson-1978) | 2.987 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.275 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.718 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.158 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 5.787 | k star (bias corrected MLE) | 3.701 |
| Theta hat (MLE) | 0.391 | Theta star (bias corrected MLE) | 0.611 |
| nu hat (MLE) | 92.6 | nu star (bias corrected) | 59.21 |
| MLE Mean (bias corrected) | 2.263 | MLE Sd (bias corrected) | 1.176 |
| | | Approximate Chi Square Value (0.05) | 42.52 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 38.96 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 3.151 | 95% Adjusted Gamma UCL (use when n<50) | 3.438 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.953 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.179 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.0953 | Mean of logged Data | 0.728 |
| Maximum of Logged Data | 1.482 | SD of logged Data | 0.451 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 3.378 | 90% Chebyshev (MVUE) UCL | 3.352 |
| 95% Chebyshev (MVUE) UCL | 3.847 | 97.5% Chebyshev (MVUE) UCL | 4.533 |
| 99% Chebyshev (MVUE) UCL | 5.881 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 2.869 | 95% Jackknife UCL | 2.961 |
| 95% Standard Bootstrap UCL | 2.829 | 95% Bootstrap-t UCL | 3.171 |
| 95% Hall's Bootstrap UCL | 3.77 | 95% Percentile Bootstrap UCL | 2.863 |
| 95% BCA Bootstrap UCL | 2.938 | | |
| 90% Chebyshev(Mean, Sd) UCL | 3.369 | 95% Chebyshev(Mean, Sd) UCL | 3.87 |
| 97.5% Chebyshev(Mean, Sd) UCL | 4.566 | 99% Chebyshev(Mean, Sd) UCL | 5.932 |

Suggested UCL to Use

95% Student's-t UCL 2.961

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | n/w | surface soil | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 4.8 | Mean | 8.825 |
| Maximum | 11.5 | Median | 9.85 |
| SD | 2.726 | Std. Error of Mean | 0.964 |
| Coefficient of Variation | 0.309 | Skewness | -0.559 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.852 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.251 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 10.65 | 95% Adjusted-CLT UCL (Chen-1995) | 10.21 |
| | | 95% Modified-t UCL (Johnson-1978) | 10.62 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.655 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.715 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.285 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.294 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 10.39 | k star (bias corrected MLE) | 6.575 |
| Theta hat (MLE) | 0.85 | Theta star (bias corrected MLE) | 1.342 |
| nu hat (MLE) | 166.2 | nu star (bias corrected) | 105.2 |
| MLE Mean (bias corrected) | 8.825 | MLE Sd (bias corrected) | 3.442 |
| | | Approximate Chi Square Value (0.05) | 82.54 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 77.47 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 11.25 | 95% Adjusted Gamma UCL (use when n<50) | 11.98 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.838 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.285 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.283 | Data Not Lognormal at 5% Significance Level | |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.569 | Mean of logged Data | 2.129 |
| Maximum of Logged Data | 2.442 | SD of logged Data | 0.347 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 11.79 | 90% Chebyshev (MVUE) UCL | 12.14 |
| 95% Chebyshev (MVUE) UCL | 13.62 | 97.5% Chebyshev (MVUE) UCL | 15.69 |
| 99% Chebyshev (MVUE) UCL | 19.74 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 10.41 | 95% Jackknife UCL | 10.65 |
| 95% Standard Bootstrap UCL | 10.32 | 95% Bootstrap-t UCL | 10.4 |
| 95% Hall's Bootstrap UCL | 10.02 | 95% Percentile Bootstrap UCL | 10.24 |
| 95% BCA Bootstrap UCL | 10.06 | | |
| 90% Chebyshev(Mean, Sd) UCL | 11.72 | 95% Chebyshev(Mean, Sd) UCL | 13.03 |
| 97.5% Chebyshev(Mean, Sd) UCL | 14.84 | 99% Chebyshev(Mean, Sd) UCL | 18.42 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 10.65 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Conc (so | n/w | surface soil | include | cobalt | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.2 | Mean | 2.75 |
| Maximum | 4.3 | Median | 2.95 |
| SD | 0.987 | Std. Error of Mean | 0.349 |
| Coefficient of Variation | 0.359 | Skewness | -0.245 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

## Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.956 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.164 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

## Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 3.411 | 95% Adjusted-CLT UCL (Chen-1995) | 3.292 |
| | | 95% Modified-t UCL (Johnson-1978) | 3.406 |

## Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.405 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.717 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.197 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

## Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 7.469 | k star (bias corrected MLE) | 4.751 |
| Theta hat (MLE) | 0.368 | Theta star (bias corrected MLE) | 0.579 |
| nu hat (MLE) | 119.5 | nu star (bias corrected) | 76.02 |
| MLE Mean (bias corrected) | 2.75 | MLE Sd (bias corrected) | 1.262 |
| | | Approximate Chi Square Value (0.05) | 56.94 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 52.78 |

## Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 3.672 | 95% Adjusted Gamma UCL (use when n<50) | 3.961 |

## Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.902 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.224 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

## Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.182 | Mean of logged Data | 0.943 |
| Maximum of Logged Data | 1.459 | SD of logged Data | 0.418 |

## Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 3.981 | 90% Chebyshev (MVUE) UCL | 4.008 |
| 95% Chebyshev (MVUE) UCL | 4.568 | 97.5% Chebyshev (MVUE) UCL | 5.347 |
| 99% Chebyshev (MVUE) UCL | 6.875 | | |

## Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 3.324 | 95% Jackknife UCL | 3.411 |
| 95% Standard Bootstrap UCL | 3.296 | 95% Bootstrap-t UCL | 3.354 |
| 95% Hall's Bootstrap UCL | 3.325 | 95% Percentile Bootstrap UCL | 3.25 |
| 95% BCA Bootstrap UCL | 3.25 | | |
| 90% Chebyshev(Mean, Sd) UCL | 3.797 | 95% Chebyshev(Mean, Sd) UCL | 4.271 |
| 97.5% Chebyshev(Mean, Sd) UCL | 4.929 | 99% Chebyshev(Mean, Sd) UCL | 6.222 |

Suggested UCL to Use

95% Student's-t UCL 3.411

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Conc (so | n/w | surface soil | include | iron | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 3460 | Mean | 6889 |
| Maximum | 10600 | Median | 7565 |
| SD | 2702 | Std. Error of Mean | 955.3 |
| Coefficient of Variation | 0.392 | Skewness | -0.0969 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.89 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.247 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 8699 | 95% Adjusted-CLT UCL (Chen-1995) | 8425 |
| | | 95% Modified-t UCL (Johnson-1978) | 8693 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.559 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.718 | Detected data appear Gamma Distributed at 5% Significance Level |

| | | | |
|---|---|---|---|
| K-S Test Statistic | 0.274 | Kolmogorov-Smirnov Gamma GOF Test | |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 6.709 | k star (bias corrected MLE) | 4.276 |
| Theta hat (MLE) | 1027 | Theta star (bias corrected MLE) | 1611 |
| nu hat (MLE) | 107.3 | nu star (bias corrected) | 68.42 |
| MLE Mean (bias corrected) | 6889 | MLE Sd (bias corrected) | 3331 |
| | | Approximate Chi Square Value (0.05) | 50.38 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 46.49 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 9355 | 95% Adjusted Gamma UCL (use when n<50) | 10139 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.874 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.263 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.149 | Mean of logged Data | 8.761 |
| Maximum of Logged Data | 9.269 | SD of logged Data | 0.431 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 10087 | 90% Chebyshev (MVUE) UCL | 10102 |
| 95% Chebyshev (MVUE) UCL | 11545 | 97.5% Chebyshev (MVUE) UCL | 13547 |
| 99% Chebyshev (MVUE) UCL | 17480 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 8460 | 95% Jackknife UCL | 8699 |
| 95% Standard Bootstrap UCL | 8341 | 95% Bootstrap-t UCL | 8666 |
| 95% Hall's Bootstrap UCL | 8220 | 95% Percentile Bootstrap UCL | 8328 |
| 95% BCA Bootstrap UCL | 8373 | | |
| 90% Chebyshev(Mean, Sd) UCL | 9755 | 95% Chebyshev(Mean, Sd) UCL | 11053 |
| 97.5% Chebyshev(Mean, Sd) UCL | 12855 | 99% Chebyshev(Mean, Sd) UCL | 16394 |

Suggested UCL to Use

95% Student's-t UCL 8699

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Conc (so | n/w | surface soil | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.029 | Mean | 0.0779 |
| Maximum | 0.18 | Median | 0.069 |
| SD | 0.0459 | Std. Error of Mean | 0.0162 |
| Coefficient of Variation | 0.59 | Skewness | 1.783 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.828 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.271 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 0.109 | 95% Adjusted-CLT UCL (Chen-1995) | 0.116 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.11 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.322 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.719 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.197 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 4.027 | k star (bias corrected MLE) | 2.6 |
| Theta hat (MLE) | 0.0193 | Theta star (bias corrected MLE) | 0.0299 |
| nu hat (MLE) | 64.43 | nu star (bias corrected) | 41.6 |
| MLE Mean (bias corrected) | 0.0779 | MLE Sd (bias corrected) | 0.0483 |
| | | Approximate Chi Square Value (0.05) | 27.82 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 25 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 0.116 | 95% Adjusted Gamma UCL (use when n<50) | 0.13 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.966 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.179 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -3.54 | Mean of logged Data | -2.682 |
| Maximum of Logged Data | -1.715 | SD of logged Data | 0.534 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 0.128 | 90% Chebyshev (MVUE) UCL | 0.122 |
| 95% Chebyshev (MVUE) UCL | 0.142 | 97.5% Chebyshev (MVUE) UCL | 0.17 |
| 99% Chebyshev (MVUE) UCL | 0.224 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.105 | 95% Jackknife UCL | 0.109 |
| 95% Standard Bootstrap UCL | 0.102 | 95% Bootstrap-t UCL | 0.13 |
| 95% Hall's Bootstrap UCL | 0.225 | 95% Percentile Bootstrap UCL | 0.105 |
| 95% BCA Bootstrap UCL | 0.112 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.127 | 95% Chebyshev(Mean, Sd) UCL | 0.149 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.179 | 99% Chebyshev(Mean, Sd) UCL | 0.239 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 0.109 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

| User Selected Options | |
|---|---|
| Date/Time of Computation | ProUCL 5.112/9/2020 3:58:42 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (so | c/s | total soil | include | 1,1,2-trichloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 15 | Number of Distinct Observations | 12 |
| Number of Detects | 2 | Number of Non-Detects | 13 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 10 |
| Minimum Detect | 25 | Minimum Non-Detect | 3.7000E-6 |
| Maximum Detect | 28 | Maximum Non-Detect | 7.2000E-5 |
| Variance Detects | 4.5 | Percent Non-Detects | 86.67% |
| Mean Detects | 26.5 | SD Detects | 2.121 |
| Median Detects | 26.5 | CV Detects | 0.08 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 3.276 | SD of Logged Detects | 0.0801 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 3.533 | KM Standard Error of Mean | 3.295 |
| KM SD | 9.025 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 9.338 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 8.954 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 13.42 | 95% KM Chebyshev UCL | 17.9 |
| 97.5% KM Chebyshev UCL | 24.11 | 99% KM Chebyshev UCL | 36.32 |

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 311.8 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.085 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 1247 | nu star (bias corrected) | N/A |
| Mean (detects) | 26.5 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 3.533 | SD (KM) | 9.025 |
| Variance (KM) | 81.45 | SE of Mean (KM) | 3.295 |
| k hat (KM) | 0.153 | k star (KM) | 0.167 |
| nu hat (KM) | 4.598 | nu star (KM) | 5.012 |
| theta hat (KM) | 23.05 | theta star (KM) | 21.15 |
| 80% gamma percentile (KM) | 4.174 | 90% gamma percentile (KM) | 10.6 |
| 95% gamma percentile (KM) | 19.02 | 99% gamma percentile (KM) | 42.92 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0324 |
| Approximate Chi Square Value (5.01, α) | 1.158 | Adjusted Chi Square Value (5.01, β) | 0.949 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 15.3 | 95% Gamma Adjusted KM-UCL (use when n<50) | 18.66 |

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 16.89 | Mean in Log Scale | 2.804 |
| SD in Original Scale | 4.15 | SD in Log Scale | 0.21 |
| 95% t UCL (assumes normality of ROS data) | 18.77 | 95% Percentile Bootstrap UCL | 18.68 |
| 95% BCA Bootstrap UCL | 19.31 | 95% Bootstrap t UCL | 21.66 |
| 95% H-UCL (Log ROS) | 18.69 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -10.4 | KM Geo Mean | 3.0347E-5 |
| KM SD (logged) | 5.365 | 95% Critical H Value (KM-Log) | 11.47 |

| | | | |
|---|---|---|---|
| KM Standard Error of Mean (logged) | 1.959 | 95% H-UCL (KM -Log) | 7.548E+8 |
| KM SD (logged) | 5.365 | 95% Critical H Value (KM-Log) | 11.47 |
| KM Standard Error of Mean (logged) | 1.959 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 3.533 | Mean in Log Scale | -10.49 |
| SD in Original Scale | 9.342 | SD in Log Scale | 5.665 |
| 95% t UCL (Assumes normality) | 7.782 | 95% H-Stat UCL | 2.351E+10 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 9.338 | KM H-UCL | 7.548E+8 |
| 95% KM (BCA) UCL | N/A | | |

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | 2-hexanone | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 15 | Number of Distinct Observations | 10 |
| Number of Detects | 1 | Number of Non-Detects | 14 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 9 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (so | c/s | total soil | include | 2-hexanone | voc) was not processed!

Conc (so | c/s | total soil | include | 4,4'-ddd | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 10 | Number of Distinct Observations | 10 |
| Number of Detects | 7 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.0013 | Minimum Non-Detect | 3.5000E-7 |
| Maximum Detect | 0.197 | Maximum Non-Detect | 4.3000E-7 |
| Variance Detects | 0.00645 | Percent Non-Detects | 30% |
| Mean Detects | 0.0846 | SD Detects | 0.0803 |
| Median Detects | 0.0509 | CV Detects | 0.95 |
| Skewness Detects | 0.495 | Kurtosis Detects | -1.903 |
| Mean of Logged Detects | -3.257 | SD of Logged Detects | 1.765 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.872 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.234 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0592 | KM Standard Error of Mean | 0.025 |
| KM SD | 0.0733 | 95% KM (BCA) UCL | 0.0973 |
| 95% KM (t) UCL | 0.105 | 95% KM (Percentile Bootstrap) UCL | 0.1 |
| 95% KM (z) UCL | 0.1 | 95% KM Bootstrap t UCL | 0.125 |
| 90% KM Chebyshev UCL | 0.134 | 95% KM Chebyshev UCL | 0.168 |
| 97.5% KM Chebyshev UCL | 0.216 | 99% KM Chebyshev UCL | 0.308 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.305 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.736 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.201 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.323 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.759 | k star (bias corrected MLE) | 0.529 |
| Theta hat (MLE) | 0.111 | Theta star (bias corrected MLE) | 0.16 |
| nu hat (MLE) | 10.63 | nu star (bias corrected) | 7.407 |
| Mean (detects) | 0.0846 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.0013 | Mean | 0.0622 |
| Maximum | 0.197 | Median | 0.021 |
| SD | 0.0748 | CV | 1.203 |
| k hat (MLE) | 0.685 | k star (bias corrected MLE) | 0.546 |
| Theta hat (MLE) | 0.0908 | Theta star (bias corrected MLE) | 0.114 |
| nu hat (MLE) | 13.71 | nu star (bias corrected) | 10.93 |
| Adjusted Level of Significance (β) | 0.0267 | | |
| Approximate Chi Square Value (10.93, α) | 4.53 | Adjusted Chi Square Value (10.93, β) | 3.84 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.15 | 95% Gamma Adjusted UCL (use when n<50) | 0.177 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0592 | SD (KM) | 0.0733 |
| Variance (KM) | 0.00537 | SE of Mean (KM) | 0.025 |
| k hat (KM) | 0.653 | k star (KM) | 0.523 |
| nu hat (KM) | 13.05 | nu star (KM) | 10.47 |
| theta hat (KM) | 0.0907 | theta star (KM) | 0.113 |
| 80% gamma percentile (KM) | 0.0974 | 90% gamma percentile (KM) | 0.159 |
| 95% gamma percentile (KM) | 0.224 | 99% gamma percentile (KM) | 0.383 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (10.47, α) | 4.237 | Adjusted Chi Square Value (10.47, β) | 3.574 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.146 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.173 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.873 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.204 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.0594 | Mean in Log Scale | -4.472 |
| SD in Original Scale | 0.0771 | SD in Log Scale | 2.429 |
| 95% t UCL (assumes normality of ROS data) | 0.104 | 95% Percentile Bootstrap UCL | 0.1 |
| 95% BCA Bootstrap UCL | 0.103 | 95% Bootstrap t UCL | 0.132 |
| 95% H-UCL (Log ROS) | 40.27 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -6.74 | KM Geo Mean | 0.00118 |
| KM SD (logged) | 5.492 | 95% Critical H Value (KM-Log) | 14.16 |
| KM Standard Error of Mean (logged) | 1.876 | 95% H-UCL (KM -Log) | 7.627E+14 |
| KM SD (logged) | 5.492 | 95% Critical H Value (KM-Log) | 14.16 |
| KM Standard Error of Mean (logged) | 1.876 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.0592 | Mean in Log Scale | -6.919 |
| SD in Original Scale | 0.0773 | SD in Log Scale | 6.069 |
| 95% t UCL (Assumes normality) | 0.104 | 95% H-Stat UCL | 5.303E+18 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (t) UCL | 0.105 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | aluminum | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 44 |
| | | Number of Missing Observations | 0 |
| Minimum | 3380 | Mean | 14179 |
| Maximum | 79300 | Median | 9960 |
| SD | 13493 | Std. Error of Mean | 1889 |

| | | | |
|---|---|---|---|
| Coefficient of Variation | 0.952 | Skewness | 3.053 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.667 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk P Value | 4.741E-14 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.26 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 17345 | 95% Adjusted-CLT UCL (Chen-1995) | 18149 |
| | | 95% Modified-t UCL (Johnson-1978) | 17480 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 1.845 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.763 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.18 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.126 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.046 | k star (bias corrected MLE) | 1.938 |
| Theta hat (MLE) | 6931 | Theta star (bias corrected MLE) | 7315 |
| nu hat (MLE) | 208.7 | nu star (bias corrected) | 197.7 |
| MLE Mean (bias corrected) | 14179 | MLE Sd (bias corrected) | 10184 |
| | | Approximate Chi Square Value (0.05) | 166.2 |
| Adjusted Level of Significance | 0.0453 | Adjusted Chi Square Value | 165.3 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 16869 | 95% Adjusted Gamma UCL (use when n<50) | 16955 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.953 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk P Value | 0.078 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.124 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Lognormal at 5% Significance Level |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.126 | Mean of logged Data | 9.296 |
| Maximum of Logged Data | 11.28 | SD of logged Data | 0.676 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 16584 | 90% Chebyshev (MVUE) UCL | 17827 |
| 95% Chebyshev (MVUE) UCL | 19735 | 97.5% Chebyshev (MVUE) UCL | 22383 |
| 99% Chebyshev (MVUE) UCL | 27586 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 17286 | 95% Jackknife UCL | 17345 |
| 95% Standard Bootstrap UCL | 17157 | 95% Bootstrap-t UCL | 18940 |
| 95% Hall's Bootstrap UCL | 19587 | 95% Percentile Bootstrap UCL | 17392 |
| 95% BCA Bootstrap UCL | 18264 | | |
| 90% Chebyshev(Mean, Sd) UCL | 19847 | 95% Chebyshev(Mean, Sd) UCL | 22414 |
| 97.5% Chebyshev(Mean, Sd) UCL | 25978 | 99% Chebyshev(Mean, Sd) UCL | 32978 |

Suggested UCL to Use

95% H-UCL 16584

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 42 | Number of Distinct Observations | 31 |
| Number of Detects | 23 | Number of Non-Detects | 19 |
| Number of Distinct Detects | 23 | Number of Distinct Non-Detects | 8 |
| Minimum Detect | 0.59 | Minimum Non-Detect | 0.8 |
| Maximum Detect | 510 | Maximum Non-Detect | 0.97 |
| Variance Detects | 11598 | Percent Non-Detects | 45.24% |
| Mean Detects | 45.03 | SD Detects | 107.7 |
| Median Detects | 11.1 | CV Detects | 2.392 |
| Skewness Detects | 4.05 | Kurtosis Detects | 17.42 |
| Mean of Logged Detects | 2.486 | SD of Logged Detects | 1.621 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.422 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.344 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 24.96 | KM Standard Error of Mean | 12.78 |
| KM SD | 81.01 | 95% KM (BCA) UCL | 48.8 |
| 95% KM (t) UCL | 46.47 | 95% KM (Percentile Bootstrap) UCL | 48.42 |
| 95% KM (z) UCL | 45.98 | 95% KM Bootstrap t UCL | 119.4 |
| 90% KM Chebyshev UCL | 63.3 | 95% KM Chebyshev UCL | 80.67 |
| 97.5% KM Chebyshev UCL | 104.8 | 99% KM Chebyshev UCL | 152.1 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.223 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.809 | Detected Data Not Gamma Distributed at 5% Significance Level |

| | | | |
|---|---|---|---|
| K-S Test Statistic | 0.207 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.192 | Detected Data Not Gamma Distributed at 5% Significance Level | |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.483 | k star (bias corrected MLE) | 0.449 |
| Theta hat (MLE) | 93.16 | Theta star (bias corrected MLE) | 100.2 |
| nu hat (MLE) | 22.23 | nu star (bias corrected) | 20.67 |
| Mean (detects) | 45.03 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 24.66 |
| Maximum | 510 | Median | 1.165 |
| SD | 82.08 | CV | 3.328 |
| k hat (MLE) | 0.189 | k star (bias corrected MLE) | 0.191 |
| Theta hat (MLE) | 130.5 | Theta star (bias corrected MLE) | 128.8 |
| nu hat (MLE) | 15.88 | nu star (bias corrected) | 16.08 |
| Adjusted Level of Significance (β) | 0.0443 | | |
| Approximate Chi Square Value (16.08, α) | 8.018 | Adjusted Chi Square Value (16.08, β) | 7.814 |
| 95% Gamma Approximate UCL (use when n>=50) | 49.46 | 95% Gamma Adjusted UCL (use when n<50) | 50.74 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 24.96 | SD (KM) | 81.01 |
| Variance (KM) | 6563 | SE of Mean (KM) | 12.78 |
| k hat (KM) | 0.0949 | k star (KM) | 0.104 |
| nu hat (KM) | 7.971 | nu star (KM) | 8.735 |
| theta hat (KM) | 263 | theta star (KM) | 240 |
| 80% gamma percentile (KM) | 18.3 | 90% gamma percentile (KM) | 67.47 |
| 95% gamma percentile (KM) | 144.5 | 99% gamma percentile (KM) | 388.7 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.74, α) | 3.168 | Adjusted Chi Square Value (8.74, β) | 3.049 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 68.82 | 95% Gamma Adjusted KM-UCL (use when n<50) | 71.49 |

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.981 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.914 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.102 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.18 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 24.95 | Mean in Log Scale | 1.029 |
| SD in Original Scale | 82 | SD in Log Scale | 2.092 |
| 95% t UCL (assumes normality of ROS data) | 46.24 | 95% Percentile Bootstrap UCL | 47.55 |
| 95% BCA Bootstrap UCL | 65.01 | 95% Bootstrap t UCL | 115.9 |

| | |
|---|---|
| 95% H-UCL (Log ROS) | 85.85 |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.171 | KM Geo Mean | 3.225 |
| KM SD (logged) | 1.864 | 95% Critical H Value (KM-Log) | 3.461 |
| KM Standard Error of Mean (logged) | 0.296 | 95% H-UCL (KM -Log) | 50.22 |
| KM SD (logged) | 1.864 | 95% Critical H Value (KM-Log) | 3.461 |
| KM Standard Error of Mean (logged) | 0.296 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 24.85 | Mean in Log Scale | 0.975 |
| SD in Original Scale | 82.03 | SD in Log Scale | 2.06 |
| 95% t UCL (Assumes normality) | 46.15 | 95% H-Stat UCL | 73.55 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (Chebyshev) UCL | 80.67 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 41 |
| Number of Detects | 50 | Number of Non-Detects | 1 |
| Number of Distinct Detects | 40 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 0.63 | Minimum Non-Detect | 0.39 |
| Maximum Detect | 59 | Maximum Non-Detect | 0.39 |
| Variance Detects | 129 | Percent Non-Detects | 1.961% |
| Mean Detects | 7.415 | SD Detects | 11.36 |
| Median Detects | 4.2 | CV Detects | 1.532 |
| Skewness Detects | 3.484 | Kurtosis Detects | 12.67 |
| Mean of Logged Detects | 1.423 | SD of Logged Detects | 1.017 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.532 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.947 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.322 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.125 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 7.277 | KM Standard Error of Mean | 1.581 |
| KM SD | 11.17 | 95% KM (BCA) UCL | 10.38 |
| 95% KM (t) UCL | 9.926 | 95% KM (Percentile Bootstrap) UCL | 10.17 |

| | | | |
|---|---|---|---|
| 95% KM (z) UCL | 9.877 | 95% KM Bootstrap t UCL | 12.26 |
| 90% KM Chebyshev UCL | 12.02 | 95% KM Chebyshev UCL | 14.17 |
| 97.5% KM Chebyshev UCL | 17.15 | 99% KM Chebyshev UCL | 23 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.23 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.78 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.178 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.129 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.994 | k star (bias corrected MLE) | 0.948 |
| Theta hat (MLE) | 7.458 | Theta star (bias corrected MLE) | 7.822 |
| nu hat (MLE) | 99.42 | nu star (bias corrected) | 94.79 |
| Mean (detects) | 7.415 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 7.27 |
| Maximum | 59 | Median | 4.1 |
| SD | 11.29 | CV | 1.553 |
| k hat (MLE) | 0.865 | k star (bias corrected MLE) | 0.827 |
| Theta hat (MLE) | 8.406 | Theta star (bias corrected MLE) | 8.79 |
| nu hat (MLE) | 88.21 | nu star (bias corrected) | 84.36 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (84.36, α) | 64.19 | Adjusted Chi Square Value (84.36, β) | 63.68 |
| 95% Gamma Approximate UCL (use when n>=50) | 9.554 | 95% Gamma Adjusted UCL (use when n<50) | 9.631 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 7.277 | SD (KM) | 11.17 |
| Variance (KM) | 124.9 | SE of Mean (KM) | 1.581 |
| k hat (KM) | 0.424 | k star (KM) | 0.412 |
| nu hat (KM) | 43.26 | nu star (KM) | 42.05 |
| theta hat (KM) | 17.16 | theta star (KM) | 17.65 |
| 80% gamma percentile (KM) | 11.78 | 90% gamma percentile (KM) | 20.44 |
| 95% gamma percentile (KM) | 29.92 | 99% gamma percentile (KM) | 53.68 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (42.05, α) | 28.19 | Adjusted Chi Square Value (42.05, β) | 27.86 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 10.86 | 95% Gamma Adjusted KM-UCL (use when n<50) | 10.99 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.951 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.947 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.103 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.125 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 7.276 | Mean in Log Scale | 1.371 |
| SD in Original Scale | 11.29 | SD in Log Scale | 1.071 |
| 95% t UCL (assumes normality of ROS data) | 9.924 | 95% Percentile Bootstrap UCL | 10 |
| 95% BCA Bootstrap UCL | 10.86 | 95% Bootstrap t UCL | 11.76 |
| 95% H-UCL (Log ROS) | 10.03 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.376 | KM Geo Mean | 3.96 |
| KM SD (logged) | 1.049 | 95% Critical H Value (KM-Log) | 2.357 |
| KM Standard Error of Mean (logged) | 0.148 | 95% H-UCL (KM -Log) | 9.738 |
| KM SD (logged) | 1.049 | 95% Critical H Value (KM-Log) | 2.357 |
| KM Standard Error of Mean (logged) | 0.148 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 7.273 | Mean in Log Scale | 1.363 |
| SD in Original Scale | 11.29 | SD in Log Scale | 1.094 |
| 95% t UCL (Assumes normality) | 9.922 | 95% H-Stat UCL | 10.3 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 9.738

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 15 | Number of Distinct Observations | 14 |
| Number of Detects | 4 | Number of Non-Detects | 11 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 10 |
| Minimum Detect | 0.185 | Minimum Non-Detect | 3.5000E-6 |
| Maximum Detect | 3 | Maximum Non-Detect | 5.0000E-5 |
| Variance Detects | 1.737 | Percent Non-Detects | 73.33% |
| Mean Detects | 1.036 | SD Detects | 1.318 |
| Median Detects | 0.48 | CV Detects | 1.272 |
| Skewness Detects | 1.921 | Kurtosis Detects | 3.751 |
| Mean of Logged Detects | -0.52 | SD of Logged Detects | 1.173 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.736 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.394 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.375 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.276 | KM Standard Error of Mean | 0.223 |
| KM SD | 0.747 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.668 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.642 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.944 | 95% KM Chebyshev UCL | 1.246 |
| 97.5% KM Chebyshev UCL | 1.666 | 99% KM Chebyshev UCL | 2.491 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.445 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.666 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.344 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.402 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.036 | k star (bias corrected MLE) | 0.426 |
| Theta hat (MLE) | 1.001 | Theta star (bias corrected MLE) | 2.435 |
| nu hat (MLE) | 8.284 | nu star (bias corrected) | 3.404 |
| Mean (detects) | 1.036 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.284 |
| Maximum | 3 | Median | 0.01 |
| SD | 0.77 | CV | 2.714 |
| k hat (MLE) | 0.305 | k star (bias corrected MLE) | 0.288 |
| Theta hat (MLE) | 0.93 | Theta star (bias corrected MLE) | 0.984 |
| nu hat (MLE) | 9.147 | nu star (bias corrected) | 8.651 |
| Adjusted Level of Significance (β) | 0.0324 | | |
| Approximate Chi Square Value (8.65, α) | 3.117 | Adjusted Chi Square Value (8.65, β) | 2.722 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.787 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.276 | SD (KM) | 0.747 |
| Variance (KM) | 0.557 | SE of Mean (KM) | 0.223 |
| k hat (KM) | 0.137 | k star (KM) | 0.154 |
| nu hat (KM) | 4.111 | nu star (KM) | 4.622 |
| theta hat (KM) | 2.017 | theta star (KM) | 1.794 |
| 80% gamma percentile (KM) | 0.307 | 90% gamma percentile (KM) | 0.822 |
| 95% gamma percentile (KM) | 1.513 | 99% gamma percentile (KM) | 3.506 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (4.62, α) | 0.982 | Adjusted Chi Square Value (4.62, β) | 0.795 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.301 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.606 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.934 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.277 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.375 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.28 | Mean in Log Scale | -4.113 |
| SD in Original Scale | 0.771 | SD in Log Scale | 2.344 |
| 95% t UCL (assumes normality of ROS data) | 0.631 | 95% Percentile Bootstrap UCL | 0.643 |
| 95% BCA Bootstrap UCL | 0.882 | 95% Bootstrap t UCL | 2.105 |
| 95% H-UCL (Log ROS) | 6.811 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -9.351 | KM Geo Mean | 8.6859E-5 |
| KM SD (logged) | 5.351 | 95% Critical H Value (KM-Log) | 11.45 |
| KM Standard Error of Mean (logged) | 1.595 | 95% H-UCL (KM -Log) | 1.848E+9 |
| KM SD (logged) | 5.351 | 95% Critical H Value (KM-Log) | 11.45 |
| KM Standard Error of Mean (logged) | 1.595 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.276 | Mean in Log Scale | -9.521 |
| SD in Original Scale | 0.773 | SD in Log Scale | 5.68 |
| 95% t UCL (Assumes normality) | 0.628 | 95% H-Stat UCL | 7.393E+10 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| ısted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) | 1.606 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 25 | Number of Distinct Observations | 13 |
| Number of Detects | 9 | Number of Non-Detects | 16 |
| Number of Distinct Detects | 8 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.13 | Minimum Non-Detect | 1.7000E-5 |
| Maximum Detect | 27 | Maximum Non-Detect | 2.1000E-5 |
| Variance Detects | 75.64 | Percent Non-Detects | 64% |
| Mean Detects | 3.902 | SD Detects | 8.697 |
| Median Detects | 0.85 | CV Detects | 2.229 |
| Skewness Detects | 2.954 | Kurtosis Detects | 8.792 |
| Mean of Logged Detects | -0.0019 | SD of Logged Detects | 1.621 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.472 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.453 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.405 | KM Standard Error of Mean | 1.117 |
| KM SD | 5.264 | 95% KM (BCA) UCL | 3.582 |
| 95% KM (t) UCL | 3.315 | 95% KM (Percentile Bootstrap) UCL | 3.472 |
| 95% KM (z) UCL | 3.242 | 95% KM Bootstrap t UCL | 14.63 |
| 90% KM Chebyshev UCL | 4.755 | 95% KM Chebyshev UCL | 6.272 |
| 97.5% KM Chebyshev UCL | 8.379 | 99% KM Chebyshev UCL | 12.52 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.911 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.776 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.304 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.295 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.47 | k star (bias corrected MLE) | 0.388 |
| Theta hat (MLE) | 8.297 | Theta star (bias corrected MLE) | 10.07 |
| nu hat (MLE) | 8.466 | nu star (bias corrected) | 6.977 |
| Mean (detects) | 3.902 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.411 |
| Maximum | 27 | Median | 0.01 |
| SD | 5.371 | CV | 3.806 |
| k hat (MLE) | 0.22 | k star (bias corrected MLE) | 0.22 |
| Theta hat (MLE) | 6.41 | Theta star (bias corrected MLE) | 6.403 |
| nu hat (MLE) | 11.01 | nu star (bias corrected) | 11.02 |
| Adjusted Level of Significance (β) | 0.0395 | | |
| Approximate Chi Square Value (11.02, α) | 4.589 | Adjusted Chi Square Value (11.02, β) | 4.309 |
| 95% Gamma Approximate UCL (use when n>=50) | 3.389 | 95% Gamma Adjusted UCL (use when n<50) | 3.61 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.405 | SD (KM) | 5.264 |
| Variance (KM) | 27.71 | SE of Mean (KM) | 1.117 |
| k hat (KM) | 0.0712 | k star (KM) | 0.0893 |
| nu hat (KM) | 3.561 | nu star (KM) | 4.467 |
| theta hat (KM) | 19.73 | theta star (KM) | 15.73 |
| 80% gamma percentile (KM) | 0.817 | 90% gamma percentile (KM) | 3.548 |

| | | | |
|---|---|---|---|
| 95% gamma percentile (KM) | 8.185 | 99% gamma percentile (KM) | 23.59 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (4.47, α) | 0.914 | Adjusted Chi Square Value (4.47, β) | 0.813 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 6.863 | 95% Gamma Adjusted KM-UCL (use when n<50) | 7.72 |

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.923 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.175 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.412 | Mean in Log Scale | -3.405 |
| SD in Original Scale | 5.371 | SD in Log Scale | 3.032 |
| 95% t UCL (assumes normality of ROS data) | 3.25 | 95% Percentile Bootstrap UCL | 3.494 |
| 95% BCA Bootstrap UCL | 4.699 | 95% Bootstrap t UCL | 15.09 |
| 95% H-UCL (Log ROS) | 112.6 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -7.029 | KM Geo Mean | 8.8550E-4 |
| KM SD (logged) | 5.35 | 95% Critical H Value (KM-Log) | 9.755 |
| KM Standard Error of Mean (logged) | 1.135 | 95% H-UCL (KM -Log) | 61458189 |
| KM SD (logged) | 5.35 | 95% Critical H Value (KM-Log) | 9.755 |
| KM Standard Error of Mean (logged) | 1.135 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.405 | Mean in Log Scale | -7.422 |
| SD in Original Scale | 5.373 | SD in Log Scale | 5.757 |
| 95% t UCL (Assumes normality) | 3.243 | 95% H-Stat UCL | 2.087E+9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 6.272

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | benzo(a)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 27 |
| Number of Detects | 15 | Number of Non-Detects | 36 |
| Number of Distinct Detects | 15 | Number of Distinct Non-Detects | 12 |

| | | | |
|---|---|---|---|
| Minimum Detect | 0.01 | Minimum Non-Detect | 1.2000E-5 |
| Maximum Detect | 23 | Maximum Non-Detect | 2.4000E-5 |
| Variance Detects | 33.93 | Percent Non-Detects | 70.59% |
| Mean Detects | 2.079 | SD Detects | 5.825 |
| Median Detects | 0.27 | CV Detects | 2.801 |
| Skewness Detects | 3.79 | Kurtosis Detects | 14.53 |
| Mean of Logged Detects | -1.147 | SD of Logged Detects | 1.947 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.374 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.445 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.22 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.612 | KM Standard Error of Mean | 0.463 |
| KM SD | 3.195 | 95% KM (BCA) UCL | 1.547 |
| 95% KM (t) UCL | 1.388 | 95% KM (Percentile Bootstrap) UCL | 1.499 |
| 95% KM (z) UCL | 1.373 | 95% KM Bootstrap t UCL | 5.784 |
| 90% KM Chebyshev UCL | 2.001 | 95% KM Chebyshev UCL | 2.63 |
| 97.5% KM Chebyshev UCL | 3.504 | 99% KM Chebyshev UCL | 5.22 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.18 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.823 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.238 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.238 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.357 | k star (bias corrected MLE) | 0.33 |
| Theta hat (MLE) | 5.829 | Theta star (bias corrected MLE) | 6.305 |
| nu hat (MLE) | 10.7 | nu star (bias corrected) | 9.895 |
| Mean (detects) | 2.079 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.619 |
| Maximum | 23 | Median | 0.01 |
| SD | 3.226 | CV | 5.214 |
| k hat (MLE) | 0.231 | k star (bias corrected MLE) | 0.231 |
| Theta hat (MLE) | 2.673 | Theta star (bias corrected MLE) | 2.68 |
| nu hat (MLE) | 23.6 | nu star (bias corrected) | 23.55 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (23.55, α) | 13.51 | Adjusted Chi Square Value (23.55, β) | 13.28 |
| 95% Gamma Approximate UCL (use when n>=50) | 1.079 | 95% Gamma Adjusted UCL (use when n<50) | 1.097 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.612 | SD (KM) | 3.195 |
| Variance (KM) | 10.21 | SE of Mean (KM) | 0.463 |
| k hat (KM) | 0.0366 | k star (KM) | 0.0475 |
| nu hat (KM) | 3.736 | nu star (KM) | 4.85 |
| theta hat (KM) | 16.7 | theta star (KM) | 12.86 |
| 80% gamma percentile (KM) | 0.0691 | 90% gamma percentile (KM) | 0.872 |
| 95% gamma percentile (KM) | 3.191 | 99% gamma percentile (KM) | 13.57 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (4.85, α) | 1.084 | Adjusted Chi Square Value (4.85, β) | 1.034 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 2.738 | 95% Gamma Adjusted KM-UCL (use when n<50) | 2.869 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.964 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.163 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.22 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.613 | Mean in Log Scale | -5.851 |
| SD in Original Scale | 3.227 | SD in Log Scale | 3.622 |
| 95% t UCL (assumes normality of ROS data) | 1.37 | 95% Percentile Bootstrap UCL | 1.504 |
| 95% BCA Bootstrap UCL | 2.364 | 95% Bootstrap t UCL | 5.842 |
| 95% H-UCL (Log ROS) | 40.97 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -8.335 | KM Geo Mean | 2.3985E-4 |
| KM SD (logged) | 4.751 | 95% Critical H Value (KM-Log) | 7.552 |
| KM Standard Error of Mean (logged) | 0.689 | 95% H-UCL (KM -Log) | 3054 |
| KM SD (logged) | 4.751 | 95% Critical H Value (KM-Log) | 7.552 |
| KM Standard Error of Mean (logged) | 0.689 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.612 | Mean in Log Scale | -8.607 |
| SD in Original Scale | 3.227 | SD in Log Scale | 4.974 |
| 95% t UCL (Assumes normality) | 1.369 | 95% H-Stat UCL | 11086 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 3054

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | benzo(b)fluoranthene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 25 | Number of Distinct Observations | 13 |
| Number of Detects | 9 | Number of Non-Detects | 16 |
| Number of Distinct Detects | 8 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.12 | Minimum Non-Detect | 1.6000E-5 |
| Maximum Detect | 29 | Maximum Non-Detect | 2.1000E-5 |
| Variance Detects | 87.74 | Percent Non-Detects | 64% |
| Mean Detects | 4.076 | SD Detects | 9.367 |
| Median Detects | 1.11 | CV Detects | 2.298 |
| Skewness Detects | 2.975 | Kurtosis Detects | 8.889 |
| Mean of Logged Detects | 0.00894 | SD of Logged Detects | 1.625 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.452 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.472 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.467 | KM Standard Error of Mean | 1.198 |
| KM SD | 5.648 | 95% KM (BCA) UCL | 3.86 |
| 95% KM (t) UCL | 3.517 | 95% KM (Percentile Bootstrap) UCL | 3.694 |
| 95% KM (z) UCL | 3.438 | 95% KM Bootstrap t UCL | 17.82 |
| 90% KM Chebyshev UCL | 5.062 | 95% KM Chebyshev UCL | 6.69 |
| 97.5% KM Chebyshev UCL | 8.95 | 99% KM Chebyshev UCL | 13.39 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.141 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.778 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.347 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.296 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.461 | k star (bias corrected MLE) | 0.381 |
| Theta hat (MLE) | 8.844 | Theta star (bias corrected MLE) | 10.69 |
| nu hat (MLE) | 8.295 | nu star (bias corrected) | 6.863 |
| Mean (detects) | 4.076 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.474 |
| Maximum | 29 | Median | 0.01 |
| SD | 5.763 | CV | 3.911 |
| k hat (MLE) | 0.218 | k star (bias corrected MLE) | 0.218 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 6.762 | Theta star (bias corrected MLE) | 6.746 |
| nu hat (MLE) | 10.9 | nu star (bias corrected) | 10.92 |
| Adjusted Level of Significance (β) | 0.0395 | | |
| Approximate Chi Square Value (10.92, α) | 4.526 | Adjusted Chi Square Value (10.92, β) | 4.247 |
| 95% Gamma Approximate UCL (use when n>=50) | 3.556 | 95% Gamma Adjusted UCL (use when n<50) | 3.789 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.467 | SD (KM) | 5.648 |
| Variance (KM) | 31.9 | SE of Mean (KM) | 1.198 |
| k hat (KM) | 0.0675 | k star (KM) | 0.086 |
| nu hat (KM) | 3.374 | nu star (KM) | 4.302 |
| theta hat (KM) | 21.74 | theta star (KM) | 17.05 |
| 80% gamma percentile (KM) | 0.8 | 90% gamma percentile (KM) | 3.632 |
| 95% gamma percentile (KM) | 8.549 | 99% gamma percentile (KM) | 25.09 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (4.30, α) | 0.845 | Adjusted Chi Square Value (4.30, β) | 0.749 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 7.474 | 95% Gamma Adjusted KM-UCL (use when n<50) | 8.432 |

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.879 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.215 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.476 | Mean in Log Scale | -3.266 |
| SD in Original Scale | 5.763 | SD in Log Scale | 2.912 |
| 95% t UCL (assumes normality of ROS data) | 3.447 | 95% Percentile Bootstrap UCL | 3.761 |
| 95% BCA Bootstrap UCL | 5.034 | 95% Bootstrap t UCL | 18.16 |
| 95% H-UCL (Log ROS) | 69.64 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -7.064 | KM Geo Mean | 8.5514E-4 |
| KM SD (logged) | 5.384 | 95% Critical H Value (KM-Log) | 9.816 |
| KM Standard Error of Mean (logged) | 1.142 | 95% H-UCL (KM -Log) | 81548205 |
| KM SD (logged) | 5.384 | 95% Critical H Value (KM-Log) | 9.816 |
| KM Standard Error of Mean (logged) | 1.142 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.467 | Mean in Log Scale | -7.439 |
| SD in Original Scale | 5.765 | SD in Log Scale | 5.778 |
| 95% t UCL (Assumes normality) | 3.44 | 95% H-Stat UCL | 2.537E+9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 6.69

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | cadmium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 26 | Number of Distinct Observations | 26 |
| Number of Detects | 25 | Number of Non-Detects | 1 |
| Number of Distinct Detects | 25 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 0.027 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 75.3 | Maximum Non-Detect | 0.16 |
| Variance Detects | 259.7 | Percent Non-Detects | 3.846% |
| Mean Detects | 12.03 | SD Detects | 16.12 |
| Median Detects | 7 | CV Detects | 1.339 |
| Skewness Detects | 2.734 | Kurtosis Detects | 9.605 |
| Mean of Logged Detects | 1.405 | SD of Logged Detects | 1.921 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.702 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.918 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.228 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.173 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 11.57 | KM Standard Error of Mean | 3.134 |
| KM SD | 15.65 | 95% KM (BCA) UCL | 17.41 |
| 95% KM (t) UCL | 16.92 | 95% KM (Percentile Bootstrap) UCL | 17.16 |
| 95% KM (z) UCL | 16.73 | 95% KM Bootstrap t UCL | 19.93 |
| 90% KM Chebyshev UCL | 20.97 | 95% KM Chebyshev UCL | 25.23 |
| 97.5% KM Chebyshev UCL | 31.14 | 99% KM Chebyshev UCL | 42.75 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.242 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.8 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.093 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.184 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.575 | k star (bias corrected MLE) | 0.532 |
| Theta hat (MLE) | 20.95 | Theta star (bias corrected MLE) | 22.61 |
| nu hat (MLE) | 28.73 | nu star (bias corrected) | 26.61 |
| Mean (detects) | 12.03 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 11.57 |
| Maximum | 75.3 | Median | 6.15 |
| SD | 15.97 | CV | 1.38 |
| k hat (MLE) | 0.499 | k star (bias corrected MLE) | 0.467 |
| Theta hat (MLE) | 23.21 | Theta star (bias corrected MLE) | 24.79 |
| nu hat (MLE) | 25.93 | nu star (bias corrected) | 24.27 |
| Adjusted Level of Significance (β) | 0.0398 | | |
| Approximate Chi Square Value (24.27, α) | 14.05 | Adjusted Chi Square Value (24.27, β) | 13.54 |
| 95% Gamma Approximate UCL (use when n>=50) | 19.98 | 95% Gamma Adjusted UCL (use when n<50) | 20.74 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 11.57 | SD (KM) | 15.65 |
| Variance (KM) | 245.1 | SE of Mean (KM) | 3.134 |
| k hat (KM) | 0.546 | k star (KM) | 0.509 |
| nu hat (KM) | 28.42 | nu star (KM) | 26.47 |
| theta hat (KM) | 21.18 | theta star (KM) | 22.73 |
| 80% gamma percentile (KM) | 19.02 | 90% gamma percentile (KM) | 31.19 |
| 95% gamma percentile (KM) | 44.17 | 99% gamma percentile (KM) | 76.04 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (26.47, α) | 15.74 | Adjusted Chi Square Value (26.47, β) | 15.19 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 19.46 | 95% Gamma Adjusted KM-UCL (use when n<50) | 20.16 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.929 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.918 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.142 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.173 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 11.57 | Mean in Log Scale | 1.256 |
| SD in Original Scale | 15.96 | SD in Log Scale | 2.03 |
| 95% t UCL (assumes normality of ROS data) | 16.92 | 95% Percentile Bootstrap UCL | 17.08 |
| 95% BCA Bootstrap UCL | 18.94 | 95% Bootstrap t UCL | 20.24 |
| 95% H-UCL (Log ROS) | 143.2 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.212 | KM Geo Mean | 3.361 |
| KM SD (logged) | 2.083 | 95% Critical H Value (KM-Log) | 4.143 |
| KM Standard Error of Mean (logged) | 0.417 | 95% H-UCL (KM -Log) | 165.1 |
| KM SD (logged) | 2.083 | 95% Critical H Value (KM-Log) | 4.143 |
| KM Standard Error of Mean (logged) | 0.417 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 11.57 | Mean in Log Scale | 1.254 |
| SD in Original Scale | 15.96 | SD in Log Scale | 2.034 |
| 95% t UCL (Assumes normality) | 16.92 | 95% H-Stat UCL | 144.8 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

ısted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) 20.16

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 43 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.8 | Mean | 40.84 |
| Maximum | 616 | Median | 13.5 |
| SD | 88.36 | Std. Error of Mean | 12.37 |
| Coefficient of Variation | 2.164 | Skewness | 5.77 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.404 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk P Value | 0 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.333 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 61.57 | 95% Adjusted-CLT UCL (Chen-1995) | 71.87 |
| | | 95% Modified-t UCL (Johnson-1978) | 63.24 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.527 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.794 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.198 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.129 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.742 | k star (bias corrected MLE) | 0.712 |
| Theta hat (MLE) | 55.01 | Theta star (bias corrected MLE) | 57.37 |
| nu hat (MLE) | 75.72 | nu star (bias corrected) | 72.6 |
| MLE Mean (bias corrected) | 40.84 | MLE Sd (bias corrected) | 48.4 |
| | | Approximate Chi Square Value (0.05) | 53.98 |
| Adjusted Level of Significance | 0.0453 | Adjusted Chi Square Value | 53.51 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 54.92 | 95% Adjusted Gamma UCL (use when n<50) | 55.4 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.948 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk P Value | 0.0436 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.112 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.123 | Data appear Lognormal at 5% Significance Level | |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.03 | Mean of logged Data | 2.902 |
| Maximum of Logged Data | 6.423 | SD of logged Data | 1.155 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 53.14 | 90% Chebyshev (MVUE) UCL | 55.38 |
| 95% Chebyshev (MVUE) UCL | 64.73 | 97.5% Chebyshev (MVUE) UCL | 77.71 |
| 99% Chebyshev (MVUE) UCL | 103.2 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 61.19 | 95% Jackknife UCL | 61.57 |
| 95% Standard Bootstrap UCL | 61.02 | 95% Bootstrap-t UCL | 90.86 |
| 95% Hall's Bootstrap UCL | 138.4 | 95% Percentile Bootstrap UCL | 62.5 |
| 95% BCA Bootstrap UCL | 80.12 | | |
| 90% Chebyshev(Mean, Sd) UCL | 77.95 | 95% Chebyshev(Mean, Sd) UCL | 94.77 |
| 97.5% Chebyshev(Mean, Sd) UCL | 118.1 | 99% Chebyshev(Mean, Sd) UCL | 163.9 |

Suggested UCL to Use

| | |
|---|---|
| 95% H-UCL | 53.14 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Conc (so | c/s | total soil | include | cobalt | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 34 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.36 | Mean | 5.049 |
| Maximum | 28 | Median | 2.9 |
| SD | 5.947 | Std. Error of Mean | 0.833 |
| Coefficient of Variation | 1.178 | Skewness | 2.665 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.641 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk P Value | 5.995E-15 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.308 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 6.445 | 95% Adjusted-CLT UCL (Chen-1995) | 6.751 |
| | | 95% Modified-t UCL (Johnson-1978) | 6.497 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.393 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.773 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.206 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.127 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.281 | k star (bias corrected MLE) | 1.219 |
| Theta hat (MLE) | 3.941 | Theta star (bias corrected MLE) | 4.143 |
| nu hat (MLE) | 130.7 | nu star (bias corrected) | 124.3 |
| MLE Mean (bias corrected) | 5.049 | MLE Sd (bias corrected) | 4.574 |
| | | Approximate Chi Square Value (0.05) | 99.56 |
| Adjusted Level of Significance | 0.0453 | Adjusted Chi Square Value | 98.92 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 6.304 | 95% Adjusted Gamma UCL (use when n<50) | 6.345 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.953 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk P Value | 0.0733 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.135 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Lognormal at 5% Significance Level |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -1.022 | Mean of logged Data | 1.181 |
| Maximum of Logged Data | 3.332 | SD of logged Data | 0.91 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 6.555 | 90% Chebyshev (MVUE) UCL | 7.018 |
| 95% Chebyshev (MVUE) UCL | 7.99 | 97.5% Chebyshev (MVUE) UCL | 9.338 |
| 99% Chebyshev (MVUE) UCL | 11.99 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 6.419 | 95% Jackknife UCL | 6.445 |

| | | | |
|---|---|---|---|
| 95% Standard Bootstrap UCL | 6.392 | 95% Bootstrap-t UCL | 7.075 |
| 95% Hall's Bootstrap UCL | 6.985 | 95% Percentile Bootstrap UCL | 6.456 |
| 95% BCA Bootstrap UCL | 6.786 | | |
| 90% Chebyshev(Mean, Sd) UCL | 7.547 | 95% Chebyshev(Mean, Sd) UCL | 8.679 |
| 97.5% Chebyshev(Mean, Sd) UCL | 10.25 | 99% Chebyshev(Mean, Sd) UCL | 13.34 |

Suggested UCL to Use

95% H-UCL 6.555

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Conc (so | c/s | total soil | include | copper | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 26 | Number of Distinct Observations | 26 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.3 | Mean | 1213 |
| Maximum | 6700 | Median | 373 |
| SD | 1763 | Std. Error of Mean | 345.8 |
| Coefficient of Variation | 1.454 | Skewness | 1.889 |

Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.726 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.92 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.247 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.17 | Data Not Normal at 5% Significance Level | |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 1804 | 95% Adjusted-CLT UCL (Chen-1995) | 1919 |
| | | 95% Modified-t UCL (Johnson-1978) | 1825 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.396 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.827 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.108 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.183 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.413 | k star (bias corrected MLE) | 0.391 |
| Theta hat (MLE) | 2936 | Theta star (bias corrected MLE) | 3101 |

| | | | |
|---|---|---|---|
| nu hat (MLE) | 21.49 | nu star (bias corrected) | 20.34 |
| MLE Mean (bias corrected) | 1213 | MLE Sd (bias corrected) | 1939 |
| | | Approximate Chi Square Value (0.05) | 11.1 |
| Adjusted Level of Significance | 0.0398 | Adjusted Chi Square Value | 10.65 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50) | 2222 | 95% Adjusted Gamma UCL (use when n<50) | 2316 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.93 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.92 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.141 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.17 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.668 | Mean of logged Data | 5.516 |
| Maximum of Logged Data | 8.81 | SD of logged Data | 2.276 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 25306 | 90% Chebyshev (MVUE) UCL | 6886 |
| 95% Chebyshev (MVUE) UCL | 8879 | 97.5% Chebyshev (MVUE) UCL | 11645 |
| 99% Chebyshev (MVUE) UCL | 17080 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1782 | 95% Jackknife UCL | 1804 |
| 95% Standard Bootstrap UCL | 1770 | 95% Bootstrap-t UCL | 2066 |
| 95% Hall's Bootstrap UCL | 2009 | 95% Percentile Bootstrap UCL | 1784 |
| 95% BCA Bootstrap UCL | 1936 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2250 | 95% Chebyshev(Mean, Sd) UCL | 2720 |
| 97.5% Chebyshev(Mean, Sd) UCL | 3372 | 99% Chebyshev(Mean, Sd) UCL | 4653 |

Suggested UCL to Use

| | |
|---|---|
| 95% Adjusted Gamma UCL | 2316 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | dibenzo(a,h)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 6 |
| Number of Detects | 1 | Number of Non-Detects | 8 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 5 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (so | c/s | total soil | include | dibenzo(a,h)anthracene | svoc) was not processed!

Conc (so | c/s | total soil | include | ethylbenzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 15 | Number of Distinct Observations | 14 |
| Number of Detects | 7 | Number of Non-Detects | 8 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 7 |
| Minimum Detect | 0.361 | Minimum Non-Detect | 3.7000E-6 |
| Maximum Detect | 16 | Maximum Non-Detect | 5.3000E-6 |
| Variance Detects | 33.21 | Percent Non-Detects | 53.33% |
| Mean Detects | 4.697 | SD Detects | 5.763 |
| Median Detects | 2.3 | CV Detects | 1.227 |
| Skewness Detects | 1.643 | Kurtosis Detects | 1.946 |
| Mean of Logged Detects | 0.898 | SD of Logged Detects | 1.266 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.753 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.369 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 2.192 | KM Standard Error of Mean | 1.208 |
| KM SD | 4.333 | 95% KM (BCA) UCL | 4.224 |
| 95% KM (t) UCL | 4.32 | 95% KM (Percentile Bootstrap) UCL | 4.242 |
| 95% KM (z) UCL | 4.18 | 95% KM Bootstrap t UCL | 10.19 |
| 90% KM Chebyshev UCL | 5.817 | 95% KM Chebyshev UCL | 7.459 |
| 97.5% KM Chebyshev UCL | 9.739 | 99% KM Chebyshev UCL | 14.22 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.437 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.731 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.295 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.321 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.9 | k star (bias corrected MLE) | 0.61 |
| Theta hat (MLE) | 5.218 | Theta star (bias corrected MLE) | 7.705 |
| nu hat (MLE) | 12.6 | nu star (bias corrected) | 8.535 |
| Mean (detects) | 4.697 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 2.197 |
| Maximum | 16 | Median | 0.01 |
| SD | 4.482 | CV | 2.04 |
| k hat (MLE) | 0.251 | k star (bias corrected MLE) | 0.245 |
| Theta hat (MLE) | 8.745 | Theta star (bias corrected MLE) | 8.952 |
| nu hat (MLE) | 7.538 | nu star (bias corrected) | 7.364 |
| Adjusted Level of Significance (β) | 0.0324 | | |
| Approximate Chi Square Value (7.36, α) | 2.372 | Adjusted Chi Square Value (7.36, β) | 2.039 |
| 95% Gamma Approximate UCL (use when n>=50) | 6.821 | 95% Gamma Adjusted UCL (use when n<50) | 7.937 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 2.192 | SD (KM) | 4.333 |
| Variance (KM) | 18.77 | SE of Mean (KM) | 1.208 |
| k hat (KM) | 0.256 | k star (KM) | 0.249 |
| nu hat (KM) | 7.678 | nu star (KM) | 7.476 |
| theta hat (KM) | 8.565 | theta star (KM) | 8.797 |
| 80% gamma percentile (KM) | 3.18 | 90% gamma percentile (KM) | 6.581 |
| 95% gamma percentile (KM) | 10.62 | 99% gamma percentile (KM) | 21.38 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (7.48, α) | 2.435 | Adjusted Chi Square Value (7.48, β) | 2.096 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 6.729 | 95% Gamma Adjusted KM-UCL (use when n<50) | 7.818 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.953 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.221 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 2.226 | Mean in Log Scale | -1.081 |
| SD in Original Scale | 4.467 | SD in Log Scale | 2.105 |
| 95% t UCL (assumes normality of ROS data) | 4.258 | 95% Percentile Bootstrap UCL | 4.193 |
| 95% BCA Bootstrap UCL | 4.988 | 95% Bootstrap t UCL | 10.93 |
| 95% H-UCL (Log ROS) | 45.53 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -6.252 | KM Geo Mean | 0.00193 |
| KM SD (logged) | 6.735 | 95% Critical H Value (KM-Log) | 14.35 |
| KM Standard Error of Mean (logged) | 1.878 | 95% H-UCL (KM -Log) | 2.249E+18 |
| KM SD (logged) | 6.735 | 95% Critical H Value (KM-Log) | 14.35 |
| KM Standard Error of Mean (logged) | 1.878 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 2.192 | Mean in Log Scale | -6.502 |
| SD in Original Scale | 4.485 | SD in Log Scale | 7.213 |
| 95% t UCL (Assumes normality) | 4.232 | 95% H-Stat UCL | 2.106E+21 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

ısted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) 7.818

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | indeno(1,2,3-cd)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 16 | Number of Distinct Observations | 12 |
| Number of Detects | 6 | Number of Non-Detects | 10 |
| Number of Distinct Detects | 6 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | 0.037 | Minimum Non-Detect | 1.8000E-5 |
| Maximum Detect | 9.6 | Maximum Non-Detect | 2.5000E-5 |
| Variance Detects | 14.45 | Percent Non-Detects | 62.5% |
| Mean Detects | 1.848 | SD Detects | 3.802 |
| Median Detects | 0.355 | CV Detects | 2.057 |
| Skewness Detects | 2.438 | Kurtosis Detects | 5.957 |
| Mean of Logged Detects | -0.891 | SD of Logged Detects | 1.811 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.541 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.788 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.468 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.325 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.693 | KM Standard Error of Mean | 0.631 |
| KM SD | 2.306 | 95% KM (BCA) UCL | 1.891 |
| 95% KM (t) UCL | 1.8 | 95% KM (Percentile Bootstrap) UCL | 1.872 |
| 95% KM (z) UCL | 1.732 | 95% KM Bootstrap t UCL | 11.36 |
| 90% KM Chebyshev UCL | 2.587 | 95% KM Chebyshev UCL | 3.445 |
| 97.5% KM Chebyshev UCL | 4.636 | 99% KM Chebyshev UCL | 6.976 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.782 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.746 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.389 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.351 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.432 | k star (bias corrected MLE) | 0.327 |
| Theta hat (MLE) | 4.279 | Theta star (bias corrected MLE) | 5.651 |
| nu hat (MLE) | 5.182 | nu star (bias corrected) | 3.924 |
| Mean (detects) | 1.848 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.699 |
| Maximum | 9.6 | Median | 0.01 |
| SD | 2.379 | CV | 3.403 |
| k hat (MLE) | 0.249 | k star (bias corrected MLE) | 0.244 |
| Theta hat (MLE) | 2.808 | Theta star (bias corrected MLE) | 2.866 |
| nu hat (MLE) | 7.967 | nu star (bias corrected) | 7.807 |
| Adjusted Level of Significance (β) | 0.0335 | | |
| Approximate Chi Square Value (7.81, α) | 2.624 | Adjusted Chi Square Value (7.81, β) | 2.294 |
| 95% Gamma Approximate UCL (use when n>=50) | 2.08 | 95% Gamma Adjusted UCL (use when n<50) | 2.38 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.693 | SD (KM) | 2.306 |
| Variance (KM) | 5.317 | SE of Mean (KM) | 0.631 |
| k hat (KM) | 0.0903 | k star (KM) | 0.115 |
| nu hat (KM) | 2.89 | nu star (KM) | 3.682 |
| theta hat (KM) | 7.672 | theta star (KM) | 6.023 |
| 80% gamma percentile (KM) | 0.579 | 90% gamma percentile (KM) | 1.939 |
| 95% gamma percentile (KM) | 3.974 | 99% gamma percentile (KM) | 10.25 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (3.68, α) | 0.6 | Adjusted Chi Square Value (3.68, β) | 0.479 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 4.251 | 95% Gamma Adjusted KM-UCL (use when n<50) | 5.322 |

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.916 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.788 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.273 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.325 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.694 | Mean in Log Scale | -4.588 |
| SD in Original Scale | 2.381 | SD in Log Scale | 3.285 |
| 95% t UCL (assumes normality of ROS data) | 1.738 | 95% Percentile Bootstrap UCL | 1.879 |
| 95% BCA Bootstrap UCL | 2.491 | 95% Bootstrap t UCL | 12.64 |
| 95% H-UCL (Log ROS) | 844.5 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -7.162 | KM Geo Mean | 7.7514E-4 |
| KM SD (logged) | 4.962 | 95% Critical H Value (KM-Log) | 10.38 |
| KM Standard Error of Mean (logged) | 1.359 | 95% H-UCL (KM -Log) | 1.029E+8 |
| KM SD (logged) | 4.962 | 95% Critical H Value (KM-Log) | 10.38 |
| KM Standard Error of Mean (logged) | 1.359 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.693 | Mean in Log Scale | -7.533 |
| SD in Original Scale | 2.381 | SD in Log Scale | 5.416 |
| 95% t UCL (Assumes normality) | 1.737 | 95% H-Stat UCL | 9.264E+9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 97.5% KM (Chebyshev) UCL | 4.636 | 99% KM (Chebyshev) UCL | 6.976 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | iron | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 46 |
| | | Number of Missing Observations | 0 |
| Minimum | 1390 | Mean | 26716 |
| Maximum | 250000 | Median | 8680 |
| SD | 49306 | Std. Error of Mean | 6904 |
| Coefficient of Variation | 1.846 | Skewness | 3.043 |

Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.526 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk P Value | 0 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.358 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.123 | Data Not Normal at 5% Significance Level | |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 38287 | 95% Adjusted-CLT UCL (Chen-1995) | 41216 |
| | | 95% Modified-t UCL (Johnson-1978) | 38778 |

Gamma GOF Test

| | | | |
|---|---|---|---|
| A-D Test Statistic | 3.99 | Anderson-Darling Gamma GOF Test | |
| 5% A-D Critical Value | 0.8 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.247 | Kolmogorov-Smirnov Gamma GOF Test | |
| 5% K-S Critical Value | 0.13 | Data Not Gamma Distributed at 5% Significance Level | |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.672 | k star (bias corrected MLE) | 0.646 |
| Theta hat (MLE) | 39748 | Theta star (bias corrected MLE) | 41377 |
| nu hat (MLE) | 68.56 | nu star (bias corrected) | 65.86 |
| MLE Mean (bias corrected) | 26716 | MLE Sd (bias corrected) | 33248 |

| | | | |
|---|---|---|---|
| | | Approximate Chi Square Value (0.05) | 48.19 |
| Adjusted Level of Significance | 0.0453 | Adjusted Chi Square Value | 47.75 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 36516 | 95% Adjusted Gamma UCL (use when n<50) | 36853 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.927 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk P Value | 0.00435 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.142 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.123 | Data Not Lognormal at 5% Significance Level | |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 7.237 | Mean of logged Data | 9.289 |
| Maximum of Logged Data | 12.43 | SD of logged Data | 1.221 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 35381 | 90% Chebyshev (MVUE) UCL | 36434 |
| 95% Chebyshev (MVUE) UCL | 42863 | 97.5% Chebyshev (MVUE) UCL | 51786 |
| 99% Chebyshev (MVUE) UCL | 69314 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 38073 | 95% Jackknife UCL | 38287 |
| 95% Standard Bootstrap UCL | 37907 | 95% Bootstrap-t UCL | 43616 |
| 95% Hall's Bootstrap UCL | 40820 | 95% Percentile Bootstrap UCL | 38636 |
| 95% BCA Bootstrap UCL | 41665 | | |
| 90% Chebyshev(Mean, Sd) UCL | 47429 | 95% Chebyshev(Mean, Sd) UCL | 56811 |
| 97.5% Chebyshev(Mean, Sd) UCL | 69834 | 99% Chebyshev(Mean, Sd) UCL | 95413 |

Suggested UCL to Use

| | |
|---|---|
| 95% Chebyshev (Mean, Sd) UCL | 56811 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | lead | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 42 | Number of Distinct Observations | 39 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.6 | Mean | 1040 |
| Maximum | 22000 | Median | 133 |
| SD | 3450 | Std. Error of Mean | 532.3 |
| Coefficient of Variation | 3.317 | Skewness | 5.773 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.313 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.942 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.382 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.135 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 1936 | 95% Adjusted-CLT UCL (Chen-1995) | 2422 |
| | | 95% Modified-t UCL (Johnson-1978) | 2015 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 1.897 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.864 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.162 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.148 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.291 | k star (bias corrected MLE) | 0.287 |
| Theta hat (MLE) | 3568 | Theta star (bias corrected MLE) | 3629 |
| nu hat (MLE) | 24.48 | nu star (bias corrected) | 24.07 |
| MLE Mean (bias corrected) | 1040 | MLE Sd (bias corrected) | 1943 |
| | | Approximate Chi Square Value (0.05) | 13.9 |
| Adjusted Level of Significance | 0.0443 | Adjusted Chi Square Value | 13.63 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 1801 | 95% Adjusted Gamma UCL (use when n<50) | 1837 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.878 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.942 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.142 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.135 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.956 | Mean of logged Data | 4.57 |
| Maximum of Logged Data | 9.999 | SD of logged Data | 2.41 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 8712 | 90% Chebyshev (MVUE) UCL | 3716 |
| 95% Chebyshev (MVUE) UCL | 4765 | 97.5% Chebyshev (MVUE) UCL | 6222 |
| 99% Chebyshev (MVUE) UCL | 9083 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1915 | 95% Jackknife UCL | 1936 |
| 95% Standard Bootstrap UCL | 1926 | 95% Bootstrap-t UCL | 4707 |

| | | | |
|---|---|---|---|
| 95% Hall's Bootstrap UCL | 4837 | 95% Percentile Bootstrap UCL | 1967 |
| 95% BCA Bootstrap UCL | 2745 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2637 | 95% Chebyshev(Mean, Sd) UCL | 3360 |
| 97.5% Chebyshev(Mean, Sd) UCL | 4364 | 99% Chebyshev(Mean, Sd) UCL | 6336 |

Suggested UCL to Use

97.5% Chebyshev (Mean, Sd) UCL 4364

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | manganese | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 35 | Number of Distinct Observations | 34 |
| | | Number of Missing Observations | 0 |
| Minimum | 40.4 | Mean | 394.8 |
| Maximum | 1600 | Median | 261 |
| SD | 401.8 | Std. Error of Mean | 67.91 |
| Coefficient of Variation | 1.018 | Skewness | 2.014 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.716 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.934 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.268 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.148 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 509.6 | 95% Adjusted-CLT UCL (Chen-1995) | 531.2 |
| | | 95% Modified-t UCL (Johnson-1978) | 513.5 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 1.076 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.768 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.159 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.152 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.433 | k star (bias corrected MLE) | 1.329 |
| Theta hat (MLE) | 275.5 | Theta star (bias corrected MLE) | 297 |
| nu hat (MLE) | 100.3 | nu star (bias corrected) | 93.04 |
| MLE Mean (bias corrected) | 394.8 | MLE Sd (bias corrected) | 342.4 |
| | | Approximate Chi Square Value (0.05) | 71.8 |
| Adjusted Level of Significance | 0.0425 | Adjusted Chi Square Value | 70.91 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 511.6 | 95% Adjusted Gamma UCL (use when n<50) | 518 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.964 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.934 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.0986 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.148 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 3.699 | Mean of logged Data | 5.59 |
| Maximum of Logged Data | 7.378 | SD of logged Data | 0.885 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 563.3 | 90% Chebyshev (MVUE) UCL | 587.8 |
| 95% Chebyshev (MVUE) UCL | 677.3 | 97.5% Chebyshev (MVUE) UCL | 801.6 |
| 99% Chebyshev (MVUE) UCL | 1046 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 506.5 | 95% Jackknife UCL | 509.6 |
| 95% Standard Bootstrap UCL | 505.3 | 95% Bootstrap-t UCL | 560.6 |
| 95% Hall's Bootstrap UCL | 532.7 | 95% Percentile Bootstrap UCL | 512.3 |
| 95% BCA Bootstrap UCL | 533.8 | | |
| 90% Chebyshev(Mean, Sd) UCL | 598.5 | 95% Chebyshev(Mean, Sd) UCL | 690.8 |
| 97.5% Chebyshev(Mean, Sd) UCL | 818.9 | 99% Chebyshev(Mean, Sd) UCL | 1070 |

Suggested UCL to Use

| | |
|---|---|
| 95% H-UCL | 563.3 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

Conc (so | c/s | total soil | include | mercury | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.04 | Mean | 0.257 |
| Maximum | 1.8 | Median | 0.16 |
| SD | 0.453 | Std. Error of Mean | 0.121 |
| Coefficient of Variation | 1.763 | Skewness | 3.499 |

## Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.469 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.363 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

## Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 0.471 | 95% Adjusted-CLT UCL (Chen-1995) | 0.577 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.49 |

## Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 1.184 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.764 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.249 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.236 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

## Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.897 | k star (bias corrected MLE) | 0.752 |
| Theta hat (MLE) | 0.286 | Theta star (bias corrected MLE) | 0.341 |
| nu hat (MLE) | 25.11 | nu star (bias corrected) | 21.06 |
| MLE Mean (bias corrected) | 0.257 | MLE Sd (bias corrected) | 0.296 |
| | | Approximate Chi Square Value (0.05) | 11.64 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 10.72 |

## Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 0.465 | 95% Adjusted Gamma UCL (use when n<50) | 0.505 |

## Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.888 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.152 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

## Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -3.219 | Mean of logged Data | -2.011 |
| Maximum of Logged Data | 0.588 | SD of logged Data | 1.029 |

## Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 0.511 | 90% Chebyshev (MVUE) UCL | 0.409 |
| 95% Chebyshev (MVUE) UCL | 0.497 | 97.5% Chebyshev (MVUE) UCL | 0.619 |
| 99% Chebyshev (MVUE) UCL | 0.858 | | |

## Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

## Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.456 | 95% Jackknife UCL | 0.471 |

| | | | |
|---|---|---|---|
| 95% Standard Bootstrap UCL | 0.454 | 95% Bootstrap-t UCL | 1.17 |
| 95% Hall's Bootstrap UCL | 1.31 | 95% Percentile Bootstrap UCL | 0.479 |
| 95% BCA Bootstrap UCL | 0.627 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.62 | 95% Chebyshev(Mean, Sd) UCL | 0.785 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1.013 | 99% Chebyshev(Mean, Sd) UCL | 1.461 |

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 0.785

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | naphthalene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 16 | Number of Distinct Observations | 14 |
| Number of Detects | 9 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 9 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.096 | Minimum Non-Detect | 1.8000E-5 |
| Maximum Detect | 12 | Maximum Non-Detect | 2.2000E-5 |
| Variance Detects | 14.09 | Percent Non-Detects | 43.75% |
| Mean Detects | 2.714 | SD Detects | 3.753 |
| Median Detects | 1 | CV Detects | 1.383 |
| Skewness Detects | 2.278 | Kurtosis Detects | 5.634 |
| Mean of Logged Detects | 0.192 | SD of Logged Detects | 1.44 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.7 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.255 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.527 | KM Standard Error of Mean | 0.789 |
| KM SD | 2.976 | 95% KM (BCA) UCL | 3.019 |
| 95% KM (t) UCL | 2.91 | 95% KM (Percentile Bootstrap) UCL | 2.824 |
| 95% KM (z) UCL | 2.825 | 95% KM Bootstrap t UCL | 4.808 |
| 90% KM Chebyshev UCL | 3.894 | 95% KM Chebyshev UCL | 4.966 |
| 97.5% KM Chebyshev UCL | 6.455 | 99% KM Chebyshev UCL | 9.378 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.332 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.752 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.184 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.289 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.744 | k star (bias corrected MLE) | 0.57 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 3.65 | Theta star (bias corrected MLE) | 4.763 |
| nu hat (MLE) | 13.38 | nu star (bias corrected) | 10.26 |
| Mean (detects) | 2.714 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.531 |
| Maximum | 12 | Median | 0.298 |
| SD | 3.071 | CV | 2.006 |
| k hat (MLE) | 0.296 | k star (bias corrected MLE) | 0.282 |
| Theta hat (MLE) | 5.168 | Theta star (bias corrected MLE) | 5.422 |
| nu hat (MLE) | 9.48 | nu star (bias corrected) | 9.036 |
| Adjusted Level of Significance (β) | 0.0335 | | |
| Approximate Chi Square Value (9.04, α) | 3.349 | Adjusted Chi Square Value (9.04, β) | 2.966 |
| 95% Gamma Approximate UCL (use when n>=50) | 4.131 | 95% Gamma Adjusted UCL (use when n<50) | 4.665 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.527 | SD (KM) | 2.976 |
| Variance (KM) | 8.856 | SE of Mean (KM) | 0.789 |
| k hat (KM) | 0.263 | k star (KM) | 0.255 |
| nu hat (KM) | 8.421 | nu star (KM) | 8.176 |
| theta hat (KM) | 5.801 | theta star (KM) | 5.975 |
| 80% gamma percentile (KM) | 2.234 | 90% gamma percentile (KM) | 4.575 |
| 95% gamma percentile (KM) | 7.342 | 99% gamma percentile (KM) | 14.68 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.18, α) | 2.837 | Adjusted Chi Square Value (8.18, β) | 2.491 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 4.399 | 95% Gamma Adjusted KM-UCL (use when n<50) | 5.011 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.97 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.158 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.54 | Mean in Log Scale | -1.476 |
| SD in Original Scale | 3.066 | SD in Log Scale | 2.251 |
| 95% t UCL (assumes normality of ROS data) | 2.884 | 95% Percentile Bootstrap UCL | 2.889 |
| 95% BCA Bootstrap UCL | 3.538 | 95% Bootstrap t UCL | 4.872 |
| 95% H-UCL (Log ROS) | 51.15 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -4.671 | KM Geo Mean | 0.00936 |
| KM SD (logged) | 5.608 | 95% Critical H Value (KM-Log) | 11.7 |
| KM Standard Error of Mean (logged) | 1.487 | 95% H-UCL (KM -Log) | 1.444E+12 |
| KM SD (logged) | 5.608 | 95% Critical H Value (KM-Log) | 11.7 |

| | |
|---|---|
| KM Standard Error of Mean (logged) | 1.487 |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.527 | Mean in Log Scale | -4.943 |
| SD in Original Scale | 3.074 | SD in Log Scale | 6.105 |
| 95% t UCL (Assumes normality) | 2.874 | 95% H-Stat UCL | 4.479E+14 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 2.91

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | nickel | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.9 | Mean | 60.99 |
| Maximum | 502 | Median | 5.1 |
| SD | 165.4 | Std. Error of Mean | 55.13 |
| Coefficient of Variation | 2.712 | Skewness | 2.999 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.403 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.509 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 163.5 | 95% Adjusted-CLT UCL (Chen-1995) | 210.6 |
| | | 95% Modified-t UCL (Johnson-1978) | 172.7 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.252 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.798 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.479 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.3 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.35 | k star (bias corrected MLE) | 0.307 |
| Theta hat (MLE) | 174.4 | Theta star (bias corrected MLE) | 198.5 |
| nu hat (MLE) | 6.296 | nu star (bias corrected) | 5.531 |
| MLE Mean (bias corrected) | 60.99 | MLE Sd (bias corrected) | 110 |
| | | Approximate Chi Square Value (0.05) | 1.405 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 1.015 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 240.1 | 95% Adjusted Gamma UCL (use when n<50) | 332.2 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.626 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.355 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.065 | Mean of logged Data | 2.188 |
| Maximum of Logged Data | 6.219 | SD of logged Data | 1.564 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 386.3 | 90% Chebyshev (MVUE) UCL | 62.74 |
| 95% Chebyshev (MVUE) UCL | 80.27 | 97.5% Chebyshev (MVUE) UCL | 104.6 |
| 99% Chebyshev (MVUE) UCL | 152.4 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 151.7 | 95% Jackknife UCL | 163.5 |
| 95% Standard Bootstrap UCL | 145.1 | 95% Bootstrap-t UCL | 4767 |
| 95% Hall's Bootstrap UCL | 3885 | 95% Percentile Bootstrap UCL | 170.7 |
| 95% BCA Bootstrap UCL | 226.1 | | |
| 90% Chebyshev(Mean, Sd) UCL | 226.4 | 95% Chebyshev(Mean, Sd) UCL | 301.3 |
| 97.5% Chebyshev(Mean, Sd) UCL | 405.3 | 99% Chebyshev(Mean, Sd) UCL | 609.6 |

Suggested UCL to Use

95% Hall's Bootstrap UCL 3885

Recommended UCL exceeds the maximum observation

In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 26 | Number of Distinct Observations | 22 |
| Number of Detects | 19 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 17 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | 0.18 | Minimum Non-Detect | 0.17 |
| Maximum Detect | 84.5 | Maximum Non-Detect | 0.3 |
| Variance Detects | 419.7 | Percent Non-Detects | 26.92% |
| Mean Detects | 19.1 | SD Detects | 20.49 |
| Median Detects | 13 | CV Detects | 1.073 |
| Skewness Detects | 2.06 | Kurtosis Detects | 5.014 |
| Mean of Logged Detects | 2.353 | SD of Logged Detects | 1.354 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.783 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.192 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 14 | KM Standard Error of Mean | 3.829 |
| KM SD | 19 | 95% KM (BCA) UCL | 21.03 |
| 95% KM (t) UCL | 20.54 | 95% KM (Percentile Bootstrap) UCL | 20.21 |
| 95% KM (z) UCL | 20.3 | 95% KM Bootstrap t UCL | 23.54 |
| 90% KM Chebyshev UCL | 25.49 | 95% KM Chebyshev UCL | 30.69 |
| 97.5% KM Chebyshev UCL | 37.91 | 99% KM Chebyshev UCL | 52.1 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.209 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.77 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.103 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.205 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.971 | k star (bias corrected MLE) | 0.853 |
| Theta hat (MLE) | 19.67 | Theta star (bias corrected MLE) | 22.39 |
| nu hat (MLE) | 36.9 | nu star (bias corrected) | 32.41 |
| Mean (detects) | 19.1 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 13.96 |
| Maximum | 84.5 | Median | 6.85 |
| SD | 19.41 | CV | 1.39 |
| k hat (MLE) | 0.317 | k star (bias corrected MLE) | 0.306 |
| Theta hat (MLE) | 44.05 | Theta star (bias corrected MLE) | 45.62 |
| nu hat (MLE) | 16.48 | nu star (bias corrected) | 15.91 |
| Adjusted Level of Significance (β) | 0.0398 | | |
| Approximate Chi Square Value (15.91, α) | 7.9 | Adjusted Chi Square Value (15.91, β) | 7.528 |
| 95% Gamma Approximate UCL (use when n>=50) | 28.12 | 95% Gamma Adjusted UCL (use when n<50) | 29.51 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 14 | SD (KM) | 19 |
| Variance (KM) | 361.1 | SE of Mean (KM) | 3.829 |
| k hat (KM) | 0.543 | k star (KM) | 0.506 |
| nu hat (KM) | 28.24 | nu star (KM) | 26.32 |
| theta hat (KM) | 25.78 | theta star (KM) | 27.67 |
| 80% gamma percentile (KM) | 23.01 | 90% gamma percentile (KM) | 37.79 |
| 95% gamma percentile (KM) | 53.56 | 99% gamma percentile (KM) | 92.3 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (26.32, α) | 15.62 | Adjusted Chi Square Value (26.32, β) | 15.08 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 23.59 | 95% Gamma Adjusted KM-UCL (use when n<50) | 24.44 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.904 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.149 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 14.13 | Mean in Log Scale | 1.595 |
| SD in Original Scale | 19.28 | SD in Log Scale | 1.723 |
| 95% t UCL (assumes normality of ROS data) | 20.59 | 95% Percentile Bootstrap UCL | 20.85 |
| 95% BCA Bootstrap UCL | 22.11 | 95% Bootstrap t UCL | 24.47 |
| 95% H-UCL (Log ROS) | 74.15 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.246 | KM Geo Mean | 3.477 |
| KM SD (logged) | 2.144 | 95% Critical H Value (KM-Log) | 4.243 |
| KM Standard Error of Mean (logged) | 0.432 | 95% H-UCL (KM -Log) | 213.4 |
| KM SD (logged) | 2.144 | 95% Critical H Value (KM-Log) | 4.243 |
| KM Standard Error of Mean (logged) | 0.432 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 13.99 | Mean in Log Scale | 1.144 |
| SD in Original Scale | 19.39 | SD in Log Scale | 2.337 |
| 95% t UCL (Assumes normality) | 20.48 | 95% H-Stat UCL | 406.3 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 20.54

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 23 | Number of Distinct Observations | 20 |
| Number of Detects | 14 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 14 | Number of Distinct Non-Detects | 7 |
| Minimum Detect | 0.03 | Minimum Non-Detect | 0.043 |
| Maximum Detect | 0.2 | Maximum Non-Detect | 1.6 |
| Variance Detects | 0.00233 | Percent Non-Detects | 39.13% |
| Mean Detects | 0.0799 | SD Detects | 0.0483 |
| Median Detects | 0.0615 | CV Detects | 0.604 |
| Skewness Detects | 1.399 | Kurtosis Detects | 1.737 |
| Mean of Logged Detects | -2.675 | SD of Logged Detects | 0.552 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.861 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.197 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0679 | KM Standard Error of Mean | 0.0107 |
| KM SD | 0.0448 | 95% KM (BCA) UCL | 0.0877 |
| 95% KM (t) UCL | 0.0863 | 95% KM (Percentile Bootstrap) UCL | 0.0868 |
| 95% KM (z) UCL | 0.0855 | 95% KM Bootstrap t UCL | 0.0939 |
| 90% KM Chebyshev UCL | 0.1 | 95% KM Chebyshev UCL | 0.115 |
| 97.5% KM Chebyshev UCL | 0.135 | 99% KM Chebyshev UCL | 0.174 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.363 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.184 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.23 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 3.536 | k star (bias corrected MLE) | 2.826 |
| Theta hat (MLE) | 0.0226 | Theta star (bias corrected MLE) | 0.0283 |

| | | | |
|---|---|---|---|
| nu hat (MLE) | 99.02 | nu star (bias corrected) | 79.13 |
| Mean (detects) | 0.0799 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.0622 |
| Maximum | 0.2 | Median | 0.055 |
| SD | 0.0452 | CV | 0.727 |
| k hat (MLE) | 2.17 | k star (bias corrected MLE) | 1.916 |
| Theta hat (MLE) | 0.0287 | Theta star (bias corrected MLE) | 0.0325 |
| nu hat (MLE) | 99.82 | nu star (bias corrected) | 88.14 |
| Adjusted Level of Significance (β) | 0.0389 | | |
| Approximate Chi Square Value (88.14, α) | 67.49 | Adjusted Chi Square Value (88.14, β) | 66.18 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.0812 | 95% Gamma Adjusted UCL (use when n<50) | 0.0828 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0679 | SD (KM) | 0.0448 |
| Variance (KM) | 0.002 | SE of Mean (KM) | 0.0107 |
| k hat (KM) | 2.301 | k star (KM) | 2.03 |
| nu hat (KM) | 105.9 | nu star (KM) | 93.39 |
| theta hat (KM) | 0.0295 | theta star (KM) | 0.0335 |
| 80% gamma percentile (KM) | 0.102 | 90% gamma percentile (KM) | 0.132 |
| 95% gamma percentile (KM) | 0.16 | 99% gamma percentile (KM) | 0.224 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (93.39, α) | 72.11 | Adjusted Chi Square Value (93.39, β) | 70.75 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.088 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.0897 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.966 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.159 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.0648 | Mean in Log Scale | -2.895 |
| SD in Original Scale | 0.0426 | SD in Log Scale | 0.55 |
| 95% t UCL (assumes normality of ROS data) | 0.0801 | 95% Percentile Bootstrap UCL | 0.0797 |
| 95% BCA Bootstrap UCL | 0.0838 | 95% Bootstrap t UCL | 0.0877 |
| 95% H-UCL (Log ROS) | 0.0815 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.86 | KM Geo Mean | 0.0572 |
| KM SD (logged) | 0.557 | 95% Critical H Value (KM-Log) | 2.024 |
| KM Standard Error of Mean (logged) | 0.134 | 95% H-UCL (KM -Log) | 0.085 |
| KM SD (logged) | 0.557 | 95% Critical H Value (KM-Log) | 2.024 |
| KM Standard Error of Mean (logged) | 0.134 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.177 | Mean in Log Scale | -2.516 |
| SD in Original Scale | 0.257 | SD in Log Scale | 1.198 |
| 95% t UCL (Assumes normality) | 0.269 | 95% H-Stat UCL | 0.338 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.0863

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | total teq (who 2005) nd = 0.5 | diox/fur)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 2 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.2500E-5 | Mean | 2.4150E-5 |
| Maximum | 2.5800E-5 | Median | 2.4150E-5 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (so | c/s | total soil | include | total teq (who 2005) nd = 0.5 | diox/fur) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (so | c/s | total soil | include | vanadium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 11 | Mean | 16.5 |
| Maximum | 51 | Median | 14 |
| SD | 10.08 | Std. Error of Mean | 2.695 |
| Coefficient of Variation | 0.611 | Skewness | 3.546 |

Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.46 | Shapiro Wilk GOF Test | |

| | | |
|---|---|---|
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.436 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 21.27 | 95% Adjusted-CLT UCL (Chen-1995) | 23.66 |
| | | 95% Modified-t UCL (Johnson-1978) | 21.7 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 2.301 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.737 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.384 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.229 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 5.731 | k star (bias corrected MLE) | 4.551 |
| Theta hat (MLE) | 2.879 | Theta star (bias corrected MLE) | 3.626 |
| nu hat (MLE) | 160.5 | nu star (bias corrected) | 127.4 |
| MLE Mean (bias corrected) | 16.5 | MLE Sd (bias corrected) | 7.735 |
| | | Approximate Chi Square Value (0.05) | 102.3 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 99.37 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 20.54 | 95% Adjusted Gamma UCL (use when n<50) | 21.16 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.628 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.346 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 2.398 | Mean of logged Data | 2.714 |
| Maximum of Logged Data | 3.932 | SD of logged Data | 0.373 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 19.81 | 90% Chebyshev (MVUE) UCL | 20.98 |
| 95% Chebyshev (MVUE) UCL | 23.2 | 97.5% Chebyshev (MVUE) UCL | 26.27 |
| 99% Chebyshev (MVUE) UCL | 32.32 | | |

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 20.93 | 95% Jackknife UCL | 21.27 |
| 95% Standard Bootstrap UCL | 20.65 | 95% Bootstrap-t UCL | 35.69 |
| 95% Hall's Bootstrap UCL | 39.91 | 95% Percentile Bootstrap UCL | 21.59 |
| 95% BCA Bootstrap UCL | 24.61 | | |

| | | | |
|---|---|---|---|
| 90% Chebyshev(Mean, Sd) UCL | 24.58 | 95% Chebyshev(Mean, Sd) UCL | 28.25 |
| 97.5% Chebyshev(Mean, Sd) UCL | 33.33 | 99% Chebyshev(Mean, Sd) UCL | 43.31 |

Suggested UCL to Use

95% Student's-t UCL 21.27 or 95% Modified-t UCL 21.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | xylene (total) | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 16 | Number of Distinct Observations | 13 |
| Number of Detects | 9 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 8 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.229 | Minimum Non-Detect | 7.4000E-6 |
| Maximum Detect | 59 | Maximum Non-Detect | 1.1000E-5 |
| Variance Detects | 415.3 | Percent Non-Detects | 43.75% |
| Mean Detects | 19.5 | SD Detects | 20.38 |
| Median Detects | 16 | CV Detects | 1.045 |
| Skewness Detects | 1.142 | Kurtosis Detects | 0.364 |
| Mean of Logged Detects | 2.128 | SD of Logged Detects | 1.763 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.863 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.235 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 10.97 | KM Standard Error of Mean | 4.602 |
| KM SD | 17.36 | 95% KM (BCA) UCL | 19.25 |
| 95% KM (t) UCL | 19.03 | 95% KM (Percentile Bootstrap) UCL | 18.44 |
| 95% KM (z) UCL | 18.54 | 95% KM Bootstrap t UCL | 25.4 |
| 90% KM Chebyshev UCL | 24.77 | 95% KM Chebyshev UCL | 31.03 |
| 97.5% KM Chebyshev UCL | 39.71 | 99% KM Chebyshev UCL | 56.76 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.196 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.754 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.151 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.29 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.715 | k star (bias corrected MLE) | 0.551 |
| Theta hat (MLE) | 27.26 | Theta star (bias corrected MLE) | 35.39 |
| nu hat (MLE) | 12.87 | nu star (bias corrected) | 9.915 |
| Mean (detects) | 19.5 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 10.97 |
| Maximum | 59 | Median | 1.115 |
| SD | 17.92 | CV | 1.634 |
| k hat (MLE) | 0.225 | k star (bias corrected MLE) | 0.224 |
| Theta hat (MLE) | 48.79 | Theta star (bias corrected MLE) | 48.9 |
| nu hat (MLE) | 7.195 | nu star (bias corrected) | 7.179 |
| Adjusted Level of Significance (β) | 0.0335 | | |
| Approximate Chi Square Value (7.18, α) | 2.269 | Adjusted Chi Square Value (7.18, β) | 1.968 |
| 95% Gamma Approximate UCL (use when n>=50) | 34.7 | 95% Gamma Adjusted UCL (use when n<50) | 40.02 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 10.97 | SD (KM) | 17.36 |
| Variance (KM) | 301.2 | SE of Mean (KM) | 4.602 |
| k hat (KM) | 0.399 | k star (KM) | 0.366 |
| nu hat (KM) | 12.78 | nu star (KM) | 11.71 |
| theta hat (KM) | 27.47 | theta star (KM) | 29.96 |
| 80% gamma percentile (KM) | 17.49 | 90% gamma percentile (KM) | 31.44 |
| 95% gamma percentile (KM) | 46.97 | 99% gamma percentile (KM) | 86.39 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (11.71, α) | 5.039 | Adjusted Chi Square Value (11.71, β) | 4.55 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 25.49 | 95% Gamma Adjusted KM-UCL (use when n<50) | 28.23 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.911 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.198 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 11.02 | Mean in Log Scale | 0.23 |
| SD in Original Scale | 17.89 | SD in Log Scale | 2.598 |
| 95% t UCL (assumes normality of ROS data) | 18.86 | 95% Percentile Bootstrap UCL | 18.58 |
| 95% BCA Bootstrap UCL | 20.8 | 95% Bootstrap t UCL | 26.95 |
| 95% H-UCL (Log ROS) | 1604 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -3.972 | KM Geo Mean | 0.0188 |
| KM SD (logged) | 7.028 | 95% Critical H Value (KM-Log) | 14.61 |
| KM Standard Error of Mean (logged) | 1.863 | 95% H-UCL (KM -Log) | 3.235E+20 |
| KM SD (logged) | 7.028 | 95% Critical H Value (KM-Log) | 14.61 |
| KM Standard Error of Mean (logged) | 1.863 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 10.97 | Mean in Log Scale | -4.175 |
| SD in Original Scale | 17.92 | SD in Log Scale | 7.492 |
| 95% t UCL (Assumes normality) | 18.82 | 95% H-Stat UCL | 2.808E+23 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 19.03

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | c/s | total soil | include | zinc | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 26 | Number of Distinct Observations | 25 |
| | | Number of Missing Observations | 0 |
| Minimum | 16.4 | Mean | 1112 |
| Maximum | 5400 | Median | 577 |
| SD | 1456 | Std. Error of Mean | 285.5 |
| Coefficient of Variation | 1.309 | Skewness | 1.728 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.754 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.92 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.248 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.17 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 1600 | 95% Adjusted-CLT UCL (Chen-1995) | 1685 |
| | | 95% Modified-t UCL (Johnson-1978) | 1616 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.345 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.803 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.107 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.18 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.562 | k star (bias corrected MLE) | 0.523 |
| Theta hat (MLE) | 1979 | Theta star (bias corrected MLE) | 2127 |
| nu hat (MLE) | 29.22 | nu star (bias corrected) | 27.18 |
| MLE Mean (bias corrected) | 1112 | MLE Sd (bias corrected) | 1538 |

| | | | |
|---|---|---|---|
| | | Approximate Chi Square Value (0.05) | 16.29 |
| Adjusted Level of Significance | 0.0398 | Adjusted Chi Square Value | 15.74 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50) | 1855 | 95% Adjusted Gamma UCL (use when n<50) | 1921 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.928 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.92 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.129 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.17 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 2.797 | Mean of logged Data | 5.904 |
| Maximum of Logged Data | 8.594 | SD of logged Data | 1.816 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 7321 | 90% Chebyshev (MVUE) UCL | 3911 |
| 95% Chebyshev (MVUE) UCL | 4937 | 97.5% Chebyshev (MVUE) UCL | 6361 |
| 99% Chebyshev (MVUE) UCL | 9157 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 1582 | 95% Jackknife UCL | 1600 |
| 95% Standard Bootstrap UCL | 1572 | 95% Bootstrap-t UCL | 1777 |
| 95% Hall's Bootstrap UCL | 1687 | 95% Percentile Bootstrap UCL | 1594 |
| 95% BCA Bootstrap UCL | 1653 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1968 | 95% Chebyshev(Mean, Sd) UCL | 2356 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2895 | 99% Chebyshev(Mean, Sd) UCL | 3952 |

Suggested UCL to Use

| | |
|---|---|
| 95% Adjusted Gamma UCL | 1921 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | n/w | total soil | include | aluminum | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 5110 | Mean | 9313 |
| Maximum | 14300 | Median | 8980 |
| SD | 3289 | Std. Error of Mean | 1163 |
| Coefficient of Variation | 0.353 | Skewness | 0.413 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

## Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.936 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.182 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

## Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 11515 | 95% Adjusted-CLT UCL (Chen-1995) | 11407 |
| | | 95% Modified-t UCL (Johnson-1978) | 11544 |

## Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.259 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.716 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.164 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.294 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

## Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 9.134 | k star (bias corrected MLE) | 5.792 |
| Theta hat (MLE) | 1020 | Theta star (bias corrected MLE) | 1608 |
| nu hat (MLE) | 146.1 | nu star (bias corrected) | 92.67 |
| MLE Mean (bias corrected) | 9313 | MLE Sd (bias corrected) | 3869 |
| | | Approximate Chi Square Value (0.05) | 71.47 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 66.78 |

## Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 12075 | 95% Adjusted Gamma UCL (use when n<50) | 12924 |

## Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.956 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.158 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

## Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.539 | Mean of logged Data | 9.083 |
| Maximum of Logged Data | 9.568 | SD of logged Data | 0.36 |

## Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 12565 | 90% Chebyshev (MVUE) UCL | 12892 |
| 95% Chebyshev (MVUE) UCL | 14512 | 97.5% Chebyshev (MVUE) UCL | 16760 |
| 99% Chebyshev (MVUE) UCL | 21175 | | |

## Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 11225 | 95% Jackknife UCL | 11515 |
| 95% Standard Bootstrap UCL | 11107 | 95% Bootstrap-t UCL | 12336 |
| 95% Hall's Bootstrap UCL | 11587 | 95% Percentile Bootstrap UCL | 11141 |
| 95% BCA Bootstrap UCL | 11215 | | |
| 90% Chebyshev(Mean, Sd) UCL | 12801 | 95% Chebyshev(Mean, Sd) UCL | 14381 |
| 97.5% Chebyshev(Mean, Sd) UCL | 16574 | 99% Chebyshev(Mean, Sd) UCL | 20882 |

Suggested UCL to Use

95% Student's-t UCL 11515

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (so | n/w | total soil | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 11 | Number of Distinct Observations | 10 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.91 | Mean | 1.919 |
| Maximum | 4.4 | Median | 1.7 |
| SD | 1.053 | Std. Error of Mean | 0.318 |
| Coefficient of Variation | 0.549 | Skewness | 1.332 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.853 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.207 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 2.495 | 95% Adjusted-CLT UCL (Chen-1995) | 2.578 |
| | | 95% Modified-t UCL (Johnson-1978) | 2.516 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.476 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.732 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.221 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.256 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 4.238 | k star (bias corrected MLE) | 3.143 |
| Theta hat (MLE) | 0.453 | Theta star (bias corrected MLE) | 0.611 |
| nu hat (MLE) | 93.23 | nu star (bias corrected) | 69.14 |

| | | | |
|---|---|---|---|
| MLE Mean (bias corrected) | 1.919 | MLE Sd (bias corrected) | 1.083 |
| | | Approximate Chi Square Value (0.05) | 51 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 48.47 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 2.602 | 95% Adjusted Gamma UCL (use when n<50) | 2.738 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.919 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.207 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -0.0943 | Mean of logged Data | 0.529 |
| Maximum of Logged Data | 1.482 | SD of logged Data | 0.51 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 2.751 | 90% Chebyshev (MVUE) UCL | 2.807 |
| 95% Chebyshev (MVUE) UCL | 3.214 | 97.5% Chebyshev (MVUE) UCL | 3.779 |
| 99% Chebyshev (MVUE) UCL | 4.889 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 2.442 | 95% Jackknife UCL | 2.495 |
| 95% Standard Bootstrap UCL | 2.408 | 95% Bootstrap-t UCL | 2.715 |
| 95% Hall's Bootstrap UCL | 2.771 | 95% Percentile Bootstrap UCL | 2.455 |
| 95% BCA Bootstrap UCL | 2.527 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2.872 | 95% Chebyshev(Mean, Sd) UCL | 3.304 |
| 97.5% Chebyshev(Mean, Sd) UCL | 3.903 | 99% Chebyshev(Mean, Sd) UCL | 5.079 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 2.495 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 11 | Number of Distinct Observations | 10 |
| | | Number of Missing Observations | 0 |
| Minimum | 4.8 | Mean | 9.1 |
| Maximum | 12 | Median | 10 |
| SD | 2.871 | Std. Error of Mean | 0.866 |
| Coefficient of Variation | 0.315 | Skewness | -0.519 |

## Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.834 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.219 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level |

Data appear Approximate Normal at 5% Significance Level

## Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 10.67 | 95% Adjusted-CLT UCL (Chen-1995) | 10.38 |
| | | 95% Modified-t UCL (Johnson-1978) | 10.65 |

## Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.931 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.73 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.257 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.255 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

## Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 9.533 | k star (bias corrected MLE) | 6.994 |
| Theta hat (MLE) | 0.955 | Theta star (bias corrected MLE) | 1.301 |
| nu hat (MLE) | 209.7 | nu star (bias corrected) | 153.9 |
| MLE Mean (bias corrected) | 9.1 | MLE Sd (bias corrected) | 3.441 |
| | | Approximate Chi Square Value (0.05) | 126.2 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 122.1 |

## Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 11.1 | 95% Adjusted Gamma UCL (use when n<50) | 11.47 |

## Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.818 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.265 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.251 | Data Not Lognormal at 5% Significance Level |

Data Not Lognormal at 5% Significance Level

## Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.569 | Mean of logged Data | 2.155 |
| Maximum of Logged Data | 2.485 | SD of logged Data | 0.357 |

## Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 11.53 | 90% Chebyshev (MVUE) UCL | 12.12 |
| 95% Chebyshev (MVUE) UCL | 13.47 | 97.5% Chebyshev (MVUE) UCL | 15.34 |
| 99% Chebyshev (MVUE) UCL | 19.02 | | |

## Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

## Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 10.52 | 95% Jackknife UCL | 10.67 |

| | | | |
|---|---|---|---|
| 95% Standard Bootstrap UCL | 10.45 | 95% Bootstrap-t UCL | 10.55 |
| 95% Hall's Bootstrap UCL | 10.25 | 95% Percentile Bootstrap UCL | 10.45 |
| 95% BCA Bootstrap UCL | 10.31 | | |
| 90% Chebyshev(Mean, Sd) UCL | 11.7 | 95% Chebyshev(Mean, Sd) UCL | 12.87 |
| 97.5% Chebyshev(Mean, Sd) UCL | 14.51 | 99% Chebyshev(Mean, Sd) UCL | 17.71 |

Suggested UCL to Use

95% Student's-t UCL 10.67

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.2 | Mean | 2.75 |
| Maximum | 4.3 | Median | 2.95 |
| SD | 0.987 | Std. Error of Mean | 0.349 |
| Coefficient of Variation | 0.359 | Skewness | -0.245 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.956 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.164 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 3.411 | 95% Adjusted-CLT UCL (Chen-1995) | 3.292 |
| | | 95% Modified-t UCL (Johnson-1978) | 3.406 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.405 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.717 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.197 | Kolmogorov-Smirnov Gamma GOF Test |

| | | |
|---|---|---|
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 7.469 | k star (bias corrected MLE) | 4.751 |
| Theta hat (MLE) | 0.368 | Theta star (bias corrected MLE) | 0.579 |
| nu hat (MLE) | 119.5 | nu star (bias corrected) | 76.02 |
| MLE Mean (bias corrected) | 2.75 | MLE Sd (bias corrected) | 1.262 |
| | | Approximate Chi Square Value (0.05) | 56.94 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 52.78 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 3.672 | 95% Adjusted Gamma UCL (use when n<50) | 3.961 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.902 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.224 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.182 | Mean of logged Data | 0.943 |
| Maximum of Logged Data | 1.459 | SD of logged Data | 0.418 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 3.981 | 90% Chebyshev (MVUE) UCL | 4.008 |
| 95% Chebyshev (MVUE) UCL | 4.568 | 97.5% Chebyshev (MVUE) UCL | 5.347 |
| 99% Chebyshev (MVUE) UCL | 6.875 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 3.324 | 95% Jackknife UCL | 3.411 |
| 95% Standard Bootstrap UCL | 3.287 | 95% Bootstrap-t UCL | 3.328 |
| 95% Hall's Bootstrap UCL | 3.331 | 95% Percentile Bootstrap UCL | 3.288 |
| 95% BCA Bootstrap UCL | 3.25 | | |
| 90% Chebyshev(Mean, Sd) UCL | 3.797 | 95% Chebyshev(Mean, Sd) UCL | 4.271 |
| 97.5% Chebyshev(Mean, Sd) UCL | 4.929 | 99% Chebyshev(Mean, Sd) UCL | 6.222 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 3.411 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 3460 | Mean | 6889 |
| Maximum | 10600 | Median | 7565 |
| SD | 2702 | Std. Error of Mean | 955.3 |
| Coefficient of Variation | 0.392 | Skewness | -0.0969 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.89 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.247 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 8699 | 95% Adjusted-CLT UCL (Chen-1995) | 8425 |
| | | 95% Modified-t UCL (Johnson-1978) | 8693 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.559 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.718 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.274 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 6.709 | k star (bias corrected MLE) | 4.276 |
| Theta hat (MLE) | 1027 | Theta star (bias corrected MLE) | 1611 |
| nu hat (MLE) | 107.3 | nu star (bias corrected) | 68.42 |
| MLE Mean (bias corrected) | 6889 | MLE Sd (bias corrected) | 3331 |
| | | Approximate Chi Square Value (0.05) | 50.38 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 46.49 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 9355 | 95% Adjusted Gamma UCL (use when n<50) | 10139 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.874 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.263 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 8.149 | Mean of logged Data | 8.761 |
| Maximum of Logged Data | 9.269 | SD of logged Data | 0.431 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 10087 | 90% Chebyshev (MVUE) UCL | 10102 |
| 95% Chebyshev (MVUE) UCL | 11545 | 97.5% Chebyshev (MVUE) UCL | 13547 |
| 99% Chebyshev (MVUE) UCL | 17480 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 8460 | 95% Jackknife UCL | 8699 |
| 95% Standard Bootstrap UCL | 8374 | 95% Bootstrap-t UCL | 8664 |
| 95% Hall's Bootstrap UCL | 8173 | 95% Percentile Bootstrap UCL | 8339 |
| 95% BCA Bootstrap UCL | 8339 | | |
| 90% Chebyshev(Mean, Sd) UCL | 9755 | 95% Chebyshev(Mean, Sd) UCL | 11053 |
| 97.5% Chebyshev(Mean, Sd) UCL | 12855 | 99% Chebyshev(Mean, Sd) UCL | 16394 |

Suggested UCL to Use

95% Student's-t UCL 8699

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 8 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.029 | Mean | 0.0779 |
| Maximum | 0.18 | Median | 0.069 |
| SD | 0.0459 | Std. Error of Mean | 0.0162 |
| Coefficient of Variation | 0.59 | Skewness | 1.783 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.828 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.271 | Lilliefors GOF Test |

| | | |
|---|---|---|
| 5% Lilliefors Critical Value | 0.283 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 0.109 | 95% Adjusted-CLT UCL (Chen-1995) | 0.116 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.11 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.322 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.719 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.197 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 4.027 | k star (bias corrected MLE) | 2.6 |
| Theta hat (MLE) | 0.0193 | Theta star (bias corrected MLE) | 0.0299 |
| nu hat (MLE) | 64.43 | nu star (bias corrected) | 41.6 |
| MLE Mean (bias corrected) | 0.0779 | MLE Sd (bias corrected) | 0.0483 |
| | | Approximate Chi Square Value (0.05) | 27.82 |
| Adjusted Level of Significance | 0.0195 | Adjusted Chi Square Value | 25 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 0.116 | 95% Adjusted Gamma UCL (use when n<50) | 0.13 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.966 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.179 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -3.54 | Mean of logged Data | -2.682 |
| Maximum of Logged Data | -1.715 | SD of logged Data | 0.534 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 0.128 | 90% Chebyshev (MVUE) UCL | 0.122 |
| 95% Chebyshev (MVUE) UCL | 0.142 | 97.5% Chebyshev (MVUE) UCL | 0.17 |
| 99% Chebyshev (MVUE) UCL | 0.224 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 0.105 | 95% Jackknife UCL | 0.109 |
| 95% Standard Bootstrap UCL | 0.103 | 95% Bootstrap-t UCL | 0.127 |
| 95% Hall's Bootstrap UCL | 0.227 | 95% Percentile Bootstrap UCL | 0.105 |
| 95% BCA Bootstrap UCL | 0.113 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.127 | 95% Chebyshev(Mean, Sd) UCL | 0.149 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.179 | 99% Chebyshev(Mean, Sd) UCL | 0.239 |

Suggested UCL to Use

95% Student's-t UCL 0.109

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.111/24/2020 9:49:30 AM |
| From File | ProUCL Input_2020.11.24_b.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 15 |
| | | Number of Missing Observations | 0 |
| Minimum | 4 | Mean | 10.36 |
| Maximum | 21.3 | Median | 8.5 |
| SD | 5.122 | Std. Error of Mean | 1.175 |
| Coefficient of Variation | 0.495 | Skewness | 1.107 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.835 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.289 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 12.4 | 95% Adjusted-CLT UCL (Chen-1995) | 12.61 |
| | | 95% Modified-t UCL (Johnson-1978) | 12.45 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.973 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.743 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.245 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.199 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 4.94 | k star (bias corrected MLE) | 4.195 |
| Theta hat (MLE) | 2.097 | Theta star (bias corrected MLE) | 2.469 |
| nu hat (MLE) | 187.7 | nu star (bias corrected) | 159.4 |

| | | | |
|---|---|---|---|
| MLE Mean (bias corrected) | 10.36 | MLE Sd (bias corrected) | 5.057 |
| | | Approximate Chi Square Value (0.05) | 131.2 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 129 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 12.58 | 95% Adjusted Gamma UCL (use when n<50) | 12.8 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.92 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.215 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Lognormal at 5% Significance Level | |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.386 | Mean of logged Data | 2.233 |
| Maximum of Logged Data | 3.059 | SD of logged Data | 0.463 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 12.88 | 90% Chebyshev (MVUE) UCL | 13.71 |
| 95% Chebyshev (MVUE) UCL | 15.25 | 97.5% Chebyshev (MVUE) UCL | 17.38 |
| 99% Chebyshev (MVUE) UCL | 21.57 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 12.29 | 95% Jackknife UCL | 12.4 |
| 95% Standard Bootstrap UCL | 12.28 | 95% Bootstrap-t UCL | 12.93 |
| 95% Hall's Bootstrap UCL | 12.5 | 95% Percentile Bootstrap UCL | 12.28 |
| 95% BCA Bootstrap UCL | 12.72 | | |
| 90% Chebyshev(Mean, Sd) UCL | 13.88 | 95% Chebyshev(Mean, Sd) UCL | 15.48 |
| 97.5% Chebyshev(Mean, Sd) UCL | 17.7 | 99% Chebyshev(Mean, Sd) UCL | 22.05 |

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 12.4 | or 95% Modified-t UCL | 12.45 |
| or 95% H-UCL | 12.88 | | |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 16 |
| | | Number of Missing Observations | 0 |
| Minimum | 16.4 | Mean | 38.66 |
| Maximum | 59 | Median | 38 |
| SD | 9.851 | Std. Error of Mean | 2.26 |
| Coefficient of Variation | 0.255 | Skewness | -0.28 |

### Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.982 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.117 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

### Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 42.58 | 95% Adjusted-CLT UCL (Chen-1995) | 42.22 |
| | | 95% Modified-t UCL (Johnson-1978) | 42.55 |

### Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.398 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.155 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.198 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

### Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 13.95 | k star (bias corrected MLE) | 11.79 |
| Theta hat (MLE) | 2.77 | Theta star (bias corrected MLE) | 3.28 |
| nu hat (MLE) | 530.3 | nu star (bias corrected) | 447.9 |
| MLE Mean (bias corrected) | 38.66 | MLE Sd (bias corrected) | 11.26 |
| | | Approximate Chi Square Value (0.05) | 399.8 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 395.9 |

### Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 43.31 | 95% Adjusted Gamma UCL (use when n<50) | 43.74 |

### Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.914 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.174 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

### Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 2.797 | Mean of logged Data | 3.618 |
| Maximum of Logged Data | 4.078 | SD of logged Data | 0.292 |

### Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 44.14 | 90% Chebyshev (MVUE) UCL | 46.7 |
| 95% Chebyshev (MVUE) UCL | 50.28 | 97.5% Chebyshev (MVUE) UCL | 55.24 |
| 99% Chebyshev (MVUE) UCL | 64.98 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 42.38 | 95% Jackknife UCL | 42.58 |
| 95% Standard Bootstrap UCL | 42.37 | 95% Bootstrap-t UCL | 42.38 |
| 95% Hall's Bootstrap UCL | 42.35 | 95% Percentile Bootstrap UCL | 42.08 |
| 95% BCA Bootstrap UCL | 42.13 | | |
| 90% Chebyshev(Mean, Sd) UCL | 45.44 | 95% Chebyshev(Mean, Sd) UCL | 48.51 |
| 97.5% Chebyshev(Mean, Sd) UCL | 52.77 | 99% Chebyshev(Mean, Sd) UCL | 61.14 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 42.58 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Conc (sd | upgradient drainage | all | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 2 |
| | | Number of Missing Observations | 0 |
| Minimum | 3 | Mean | 8.15 |
| Maximum | 13.3 | Median | 8.15 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (sd | upgradient drainage | all | include | arsenic | tmet) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (sd | upgradient drainage | all | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 2 |
| | | Number of Missing Observations | 0 |
| Minimum | 8.6 | Mean | 18.05 |
| Maximum | 27.5 | Median | 18.05 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (sd | upgradient drainage | all | include | chromium | tmet) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

UCL Statistics for Data Sets with Non-Detects

| User Selected Options | |
|---|---|
| Date/Time of Computation | ProUCL 5.112/9/2020 11:40:32 AM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (sw | downgradient estuarine | all | include | antimony | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 1 | Number of Non-Detects | 6 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 3 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (sw | downgradient estuarine | all | include | antimony | tmet) was not processed!

Conc (sw | downgradient estuarine | all | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 7 |
| | | Number of Missing Observations | 0 |
| Minimum | 7 | Mean | 9.5 |
| Maximum | 11.7 | Median | 9.3 |
| SD | 1.67 | Std. Error of Mean | 0.631 |
| Coefficient of Variation | 0.176 | Skewness | -0.269 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.966 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.154 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| 95% Normal UCL | 95% UCLs (Adjusted for Skewness) |
|---|---|

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 10.73 | 95% Adjusted-CLT UCL (Chen-1995) | 10.47 |
| | | 95% Modified-t UCL (Johnson-1978) | 10.72 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.239 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.707 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.176 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.311 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 36.13 | k star (bias corrected MLE) | 20.74 |
| Theta hat (MLE) | 0.263 | Theta star (bias corrected MLE) | 0.458 |
| nu hat (MLE) | 505.8 | nu star (bias corrected) | 290.4 |
| MLE Mean (bias corrected) | 9.5 | MLE Sd (bias corrected) | 2.086 |
| | | Approximate Chi Square Value (0.05) | 251.9 |
| Adjusted Level of Significance | 0.0158 | Adjusted Chi Square Value | 241 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 10.95 | 95% Adjusted Gamma UCL (use when n<50) | 11.44 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.953 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.175 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.946 | Mean of logged Data | 2.237 |
| Maximum of Logged Data | 2.46 | SD of logged Data | 0.182 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 11.03 | 90% Chebyshev (MVUE) UCL | 11.47 |
| 95% Chebyshev (MVUE) UCL | 12.36 | 97.5% Chebyshev (MVUE) UCL | 13.6 |
| 99% Chebyshev (MVUE) UCL | 16.03 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 10.54 | 95% Jackknife UCL | 10.73 |
| 95% Standard Bootstrap UCL | 10.47 | 95% Bootstrap-t UCL | 10.58 |
| 95% Hall's Bootstrap UCL | 10.41 | 95% Percentile Bootstrap UCL | 10.44 |
| 95% BCA Bootstrap UCL | 10.37 | | |
| 90% Chebyshev(Mean, Sd) UCL | 11.39 | 95% Chebyshev(Mean, Sd) UCL | 12.25 |
| 97.5% Chebyshev(Mean, Sd) UCL | 13.44 | 99% Chebyshev(Mean, Sd) UCL | 15.78 |

Suggested UCL to Use

| | |
|---|---|
| 95% Student's-t UCL | 10.73 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Conc (sw | downgradient estuarine | all | include | iron | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 7 |
| | | Number of Missing Observations | 0 |
| Minimum | 228 | Mean | 454.4 |
| Maximum | 1030 | Median | 380 |
| SD | 271.3 | Std. Error of Mean | 102.5 |
| Coefficient of Variation | 0.597 | Skewness | 2.008 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.774 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.272 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Data appear Normal at 5% Significance Level |

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 653.7 | 95% Adjusted-CLT UCL (Chen-1995) | 706.2 |
| | | 95% Modified-t UCL (Johnson-1978) | 666.6 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.457 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.71 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.226 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.313 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 4.44 | k star (bias corrected MLE) | 2.632 |
| Theta hat (MLE) | 102.3 | Theta star (bias corrected MLE) | 172.6 |
| nu hat (MLE) | 62.16 | nu star (bias corrected) | 36.85 |
| MLE Mean (bias corrected) | 454.4 | MLE Sd (bias corrected) | 280.1 |
| | | Approximate Chi Square Value (0.05) | 23.96 |
| Adjusted Level of Significance | 0.0158 | Adjusted Chi Square Value | 20.87 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 699.1 | 95% Adjusted Gamma UCL (use when n<50) | 802.3 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.923 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.193 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 5.429 | Mean of logged Data | 6.002 |
| Maximum of Logged Data | 6.937 | SD of logged Data | 0.491 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 745 | 90% Chebyshev (MVUE) UCL | 698.5 |
| 95% Chebyshev (MVUE) UCL | 812.1 | 97.5% Chebyshev (MVUE) UCL | 969.7 |
| 99% Chebyshev (MVUE) UCL | 1279 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 623.1 | 95% Jackknife UCL | 653.7 |
| 95% Standard Bootstrap UCL | 609.4 | 95% Bootstrap-t UCL | 946.7 |
| 95% Hall's Bootstrap UCL | 1399 | 95% Percentile Bootstrap UCL | 636.1 |
| 95% BCA Bootstrap UCL | 687.9 | | |
| 90% Chebyshev(Mean, Sd) UCL | 762 | 95% Chebyshev(Mean, Sd) UCL | 901.3 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1095 | 99% Chebyshev(Mean, Sd) UCL | 1475 |

Suggested UCL to Use

95% Student's-t UCL 653.7

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.112/17/2020 3:52:21 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (wg | surficial aquifer | site-wide | include | 1,1'-biphenyl | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 18 |

| | | | |
|---|---|---|---|
| Number of Detects | 14 | Number of Non-Detects | 37 |
| Number of Distinct Detects | 13 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 1.1 | Minimum Non-Detect | 0.22 |
| Maximum Detect | 5.5 | Maximum Non-Detect | 0.44 |
| Variance Detects | 1.506 | Percent Non-Detects | 72.55% |
| Mean Detects | 3.143 | SD Detects | 1.227 |
| Median Detects | 2.95 | CV Detects | 0.39 |
| Skewness Detects | 0.633 | Kurtosis Detects | 0.439 |
| Mean of Logged Detects | 1.07 | SD of Logged Detects | 0.418 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.941 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.163 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.022 | KM Standard Error of Mean | 0.21 |
| KM SD | 1.444 | 95% KM (BCA) UCL | 1.353 |
| 95% KM (t) UCL | 1.374 | 95% KM (Percentile Bootstrap) UCL | 1.36 |
| 95% KM (z) UCL | 1.368 | 95% KM Bootstrap t UCL | 1.426 |
| 90% KM Chebyshev UCL | 1.652 | 95% KM Chebyshev UCL | 1.937 |
| 97.5% KM Chebyshev UCL | 2.333 | 99% KM Chebyshev UCL | 3.11 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.252 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.737 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.113 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.229 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 6.778 | k star (bias corrected MLE) | 5.373 |
| Theta hat (MLE) | 0.464 | Theta star (bias corrected MLE) | 0.585 |
| nu hat (MLE) | 189.8 | nu star (bias corrected) | 150.4 |
| Mean (detects) | 3.143 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.052 |
| Maximum | 5.5 | Median | 0.24 |
| SD | 1.485 | CV | 1.411 |
| k hat (MLE) | 0.333 | k star (bias corrected MLE) | 0.326 |
| Theta hat (MLE) | 3.161 | Theta star (bias corrected MLE) | 3.224 |
| nu hat (MLE) | 33.96 | nu star (bias corrected) | 33.29 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (33.29, α) | 21.1 | Adjusted Chi Square Value (33.29, β) | 20.82 |

| | | | |
|---|---|---|---|
| 95% Gamma Approximate UCL (use when n>=50) | 1.661 | 95% Gamma Adjusted UCL (use when n<50) | 1.683 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.022 | SD (KM) | 1.444 |
| Variance (KM) | 2.085 | SE of Mean (KM) | 0.21 |
| k hat (KM) | 0.501 | k star (KM) | 0.485 |
| nu hat (KM) | 51.13 | nu star (KM) | 49.45 |
| theta hat (KM) | 2.04 | theta star (KM) | 2.109 |
| 80% gamma percentile (KM) | 1.677 | 90% gamma percentile (KM) | 2.784 |
| 95% gamma percentile (KM) | 3.971 | 99% gamma percentile (KM) | 6.898 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (49.45, α) | 34.31 | Adjusted Chi Square Value (49.45, β) | 33.94 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.474 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.49 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.952 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.142 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.439 | Mean in Log Scale | 0.0341 |
| SD in Original Scale | 1.271 | SD in Log Scale | 0.818 |
| 95% t UCL (assumes normality of ROS data) | 1.737 | 95% Percentile Bootstrap UCL | 1.732 |
| 95% BCA Bootstrap UCL | 1.77 | 95% Bootstrap t UCL | 1.786 |
| 95% H-UCL (Log ROS) | 1.849 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.805 | KM Geo Mean | 0.447 |
| KM SD (logged) | 1.172 | 95% Critical H Value (KM-Log) | 2.491 |
| KM Standard Error of Mean (logged) | 0.17 | 95% H-UCL (KM -Log) | 1.343 |
| KM SD (logged) | 1.172 | 95% Critical H Value (KM-Log) | 2.491 |
| KM Standard Error of Mean (logged) | 0.17 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.997 | Mean in Log Scale | -0.944 |
| SD in Original Scale | 1.473 | SD in Log Scale | 1.281 |
| 95% t UCL (Assumes normality) | 1.343 | 95% H-Stat UCL | 1.42 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.374

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | 1,2-dichloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 8 |
| Number of Detects | 4 | Number of Non-Detects | 46 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.2 | Minimum Non-Detect | 0.29 |
| Maximum Detect | 17.6 | Maximum Non-Detect | 2.9 |
| Variance Detects | 67.59 | Percent Non-Detects | 92% |
| Mean Detects | 6.798 | SD Detects | 8.221 |
| Median Detects | 4.695 | CV Detects | 1.209 |
| Skewness Detects | 0.891 | Kurtosis Detects | -1.086 |
| Mean of Logged Detects | 0.726 | SD of Logged Detects | 2.138 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.877 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.275 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.375 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.762 | KM Standard Error of Mean | 0.441 |
| KM SD | 2.69 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 1.501 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 1.487 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 2.085 | 95% KM Chebyshev UCL | 2.684 |
| 97.5% KM Chebyshev UCL | 3.517 | 99% KM Chebyshev UCL | 5.151 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.352 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.68 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.283 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.41 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.529 | k star (bias corrected MLE) | 0.299 |
| Theta hat (MLE) | 12.85 | Theta star (bias corrected MLE) | 22.74 |
| nu hat (MLE) | 4.233 | nu star (bias corrected) | 2.391 |
| Mean (detects) | 6.798 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.011 |
| Maximum | 17.6 | Median | 0.01 |

| | | | |
|---|---|---|---|
| SD | 2.96 | CV | 2.927 |
| k hat (MLE) | 0.224 | k star (bias corrected MLE) | 0.224 |
| Theta hat (MLE) | 4.51 | Theta star (bias corrected MLE) | 4.513 |
| nu hat (MLE) | 22.42 | nu star (bias corrected) | 22.41 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (22.41, α) | 12.65 | Adjusted Chi Square Value (22.41, β) | 12.43 |
| 95% Gamma Approximate UCL (use when n>=50) | 1.792 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.762 | SD (KM) | 2.69 |
| Variance (KM) | 7.235 | SE of Mean (KM) | 0.441 |
| k hat (KM) | 0.0802 | k star (KM) | 0.0887 |
| nu hat (KM) | 8.017 | nu star (KM) | 8.869 |
| theta hat (KM) | 9.5 | theta star (KM) | 8.587 |
| 80% gamma percentile (KM) | 0.438 | 90% gamma percentile (KM) | 1.916 |
| 95% gamma percentile (KM) | 4.438 | 99% gamma percentile (KM) | 12.84 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.87, α) | 3.248 | Adjusted Chi Square Value (8.87, β) | 3.147 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 2.08 | 95% Gamma Adjusted KM-UCL (use when n<50) | 2.146 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.909 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.251 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.375 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.898 | Mean in Log Scale | -1.674 |
| SD in Original Scale | 2.745 | SD in Log Scale | 1.672 |
| 95% t UCL (assumes normality of ROS data) | 1.549 | 95% Percentile Bootstrap UCL | 1.603 |
| 95% BCA Bootstrap UCL | 2.018 | 95% Bootstrap t UCL | 3.748 |
| 95% H-UCL (Log ROS) | 1.618 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.329 | KM Geo Mean | 0.265 |
| KM SD (logged) | 0.856 | 95% Critical H Value (KM-Log) | 2.195 |
| KM Standard Error of Mean (logged) | 0.18 | 95% H-UCL (KM -Log) | 0.5 |
| KM SD (logged) | 0.856 | 95% Critical H Value (KM-Log) | 2.195 |
| KM Standard Error of Mean (logged) | 0.18 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.925 | Mean in Log Scale | -0.863 |
| SD in Original Scale | 2.693 | SD in Log Scale | 0.849 |
| 95% t UCL (Assumes normality) | 1.564 | 95% H-Stat UCL | 0.788 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.501

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 23 |
| Number of Detects | 19 | Number of Non-Detects | 32 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.065 | Minimum Non-Detect | 0.1 |
| Maximum Detect | 71 | Maximum Non-Detect | 0.76 |
| Variance Detects | 573.6 | Percent Non-Detects | 62.75% |
| Mean Detects | 31.22 | SD Detects | 23.95 |
| Median Detects | 35.4 | CV Detects | 0.767 |
| Skewness Detects | 0.0259 | Kurtosis Detects | -1.199 |
| Mean of Logged Detects | 2.342 | SD of Logged Detects | 2.39 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.915 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.155 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 11.68 | KM Standard Error of Mean | 2.981 |
| KM SD | 20.72 | 95% KM (BCA) UCL | 16.33 |
| 95% KM (t) UCL | 16.67 | 95% KM (Percentile Bootstrap) UCL | 16.55 |
| 95% KM (z) UCL | 16.58 | 95% KM Bootstrap t UCL | 17.47 |
| 90% KM Chebyshev UCL | 20.62 | 95% KM Chebyshev UCL | 24.67 |
| 97.5% KM Chebyshev UCL | 30.29 | 99% KM Chebyshev UCL | 41.33 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.687 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.796 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.294 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.209 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.567 | k star (bias corrected MLE) | 0.512 |
| Theta hat (MLE) | 55.07 | Theta star (bias corrected MLE) | 60.92 |
| nu hat (MLE) | 21.54 | nu star (bias corrected) | 19.47 |
| Mean (detects) | 31.22 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 12.86 |
| Maximum | 71 | Median | 1.6 |
| SD | 20.41 | CV | 1.587 |
| k hat (MLE) | 0.234 | k star (bias corrected MLE) | 0.233 |
| Theta hat (MLE) | 55.05 | Theta star (bias corrected MLE) | 55.2 |
| nu hat (MLE) | 23.83 | nu star (bias corrected) | 23.76 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (23.76, α) | 13.67 | Adjusted Chi Square Value (23.76, β) | 13.44 |
| 95% Gamma Approximate UCL (use when n>=50) | 22.36 | 95% Gamma Adjusted UCL (use when n<50) | 22.73 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 11.68 | SD (KM) | 20.72 |
| Variance (KM) | 429.2 | SE of Mean (KM) | 2.981 |
| k hat (KM) | 0.318 | k star (KM) | 0.312 |
| nu hat (KM) | 32.4 | nu star (KM) | 31.83 |
| theta hat (KM) | 36.76 | theta star (KM) | 37.42 |
| 80% gamma percentile (KM) | 18.07 | 90% gamma percentile (KM) | 34.27 |
| 95% gamma percentile (KM) | 52.74 | 99% gamma percentile (KM) | 100.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.83, α) | 19.94 | Adjusted Chi Square Value (31.83, β) | 19.66 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 18.64 | 95% Gamma Adjusted KM-UCL (use when n<50) | 18.9 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.735 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.303 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 11.86 | Mean in Log Scale | -0.406 |
| SD in Original Scale | 20.82 | SD in Log Scale | 2.921 |
| 95% t UCL (assumes normality of ROS data) | 16.74 | 95% Percentile Bootstrap UCL | 16.75 |
| 95% BCA Bootstrap UCL | 17.65 | 95% Bootstrap t UCL | 17.82 |
| 95% H-UCL (Log ROS) | 348.9 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.773 | KM Geo Mean | 0.461 |
| KM SD (logged) | 2.791 | 95% Critical H Value (KM-Log) | 4.643 |
| KM Standard Error of Mean (logged) | 0.404 | 95% H-UCL (KM -Log) | 141.6 |
| KM SD (logged) | 2.791 | 95% Critical H Value (KM-Log) | 4.643 |
| KM Standard Error of Mean (logged) | 0.404 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 11.71 | Mean in Log Scale | -0.694 |
| SD in Original Scale | 20.91 | SD in Log Scale | 2.838 |

| | | | |
|---|---|---|---|
| 95% t UCL (Assumes normality) | 16.61 | 95% H-Stat UCL | 185.8 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 16.67

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 20 |
| Number of Detects | 18 | Number of Non-Detects | 33 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 38.6 | Minimum Non-Detect | 23 |
| Maximum Detect | 55000 | Maximum Non-Detect | 200 |
| Variance Detects | 1.667E+8 | Percent Non-Detects | 64.71% |
| Mean Detects | 6121 | SD Detects | 12909 |
| Median Detects | 919 | CV Detects | 2.109 |
| Skewness Detects | 3.538 | Kurtosis Detects | 13.66 |
| Mean of Logged Detects | 6.864 | SD of Logged Detects | 2.225 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.504 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.319 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 2188 | KM Standard Error of Mean | 1153 |
| KM SD | 7999 | 95% KM (BCA) UCL | 4117 |
| 95% KM (t) UCL | 4119 | 95% KM (Percentile Bootstrap) UCL | 4239 |
| 95% KM (z) UCL | 4084 | 95% KM Bootstrap t UCL | 7857 |
| 90% KM Chebyshev UCL | 5645 | 95% KM Chebyshev UCL | 7212 |
| 97.5% KM Chebyshev UCL | 9386 | 99% KM Chebyshev UCL | 13656 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.77 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.829 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.197 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.219 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.361 | k star (bias corrected MLE) | 0.338 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 16975 | Theta star (bias corrected MLE) | 18135 |
| nu hat (MLE) | 12.98 | nu star (bias corrected) | 12.15 |
| Mean (detects) | 6121 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 2160 |
| Maximum | 55000 | Median | 0.01 |
| SD | 8086 | CV | 3.743 |
| k hat (MLE) | 0.0988 | k star (bias corrected MLE) | 0.106 |
| Theta hat (MLE) | 21872 | Theta star (bias corrected MLE) | 20374 |
| nu hat (MLE) | 10.07 | nu star (bias corrected) | 10.81 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (10.81, α) | 4.457 | Adjusted Chi Square Value (10.81, β) | 4.339 |
| 95% Gamma Approximate UCL (use when n>=50) | 5242 | 95% Gamma Adjusted UCL (use when n<50) | 5385 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 2188 | SD (KM) | 7999 |
| Variance (KM) | 63988400 | SE of Mean (KM) | 1153 |
| k hat (KM) | 0.0748 | k star (KM) | 0.0835 |
| nu hat (KM) | 7.629 | nu star (KM) | 8.513 |
| theta hat (KM) | 29250 | theta star (KM) | 26211 |
| 80% gamma percentile (KM) | 1128 | 90% gamma percentile (KM) | 5322 |
| 95% gamma percentile (KM) | 12740 | 99% gamma percentile (KM) | 37970 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.51, α) | 3.036 | Adjusted Chi Square Value (8.51, β) | 2.941 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 6135 | 95% Gamma Adjusted KM-UCL (use when n<50) | 6332 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.935 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.167 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 2185 | Mean in Log Scale | 3.702 |
| SD in Original Scale | 8080 | SD in Log Scale | 3.252 |
| 95% t UCL (assumes normality of ROS data) | 4081 | 95% Percentile Bootstrap UCL | 4256 |
| 95% BCA Bootstrap UCL | 5851 | 95% Bootstrap t UCL | 7759 |
| 95% H-UCL (Log ROS) | 92263 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 4.763 | KM Geo Mean | 117.1 |
| KM SD (logged) | 2.054 | 95% Critical H Value (KM-Log) | 3.606 |
| KM Standard Error of Mean (logged) | 0.322 | 95% H-UCL (KM -Log) | 2753 |
| KM SD (logged) | 2.054 | 95% Critical H Value (KM-Log) | 3.606 |

| | |
|---|---|
| KM Standard Error of Mean (logged) | 0.322 |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 2220 | Mean in Log Scale | 5.275 |
| SD in Original Scale | 8070 | SD in Log Scale | 1.828 |
| 95% t UCL (Assumes normality) | 4114 | 95% H-Stat UCL | 2440 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM Approximate Gamma UCL | 6135 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | antimony | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 4 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | antimony | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 20 |
| Number of Detects | 20 | Number of Non-Detects | 31 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 1.7 | Minimum Non-Detect | 0.94 |
| Maximum Detect | 71 | Maximum Non-Detect | 8 |
| Variance Detects | 221.7 | Percent Non-Detects | 60.78% |
| Mean Detects | 8.52 | SD Detects | 14.89 |
| Median Detects | 5.6 | CV Detects | 1.747 |
| Skewness Detects | 4.293 | Kurtosis Detects | 18.88 |
| Mean of Logged Detects | 1.677 | SD of Logged Detects | 0.787 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.375 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.905 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.426 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.192 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 5.224 | KM Standard Error of Mean | 1.412 |
| KM SD | 9.594 | 95% KM (BCA) UCL | 8.116 |
| 95% KM (t) UCL | 7.591 | 95% KM (Percentile Bootstrap) UCL | 7.728 |
| 95% KM (z) UCL | 7.547 | 95% KM Bootstrap t UCL | 10.98 |
| 90% KM Chebyshev UCL | 9.461 | 95% KM Chebyshev UCL | 11.38 |
| 97.5% KM Chebyshev UCL | 14.04 | 99% KM Chebyshev UCL | 19.28 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.076 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.764 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.289 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.199 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.214 | k star (bias corrected MLE) | 1.065 |
| Theta hat (MLE) | 7.017 | Theta star (bias corrected MLE) | 7.997 |
| nu hat (MLE) | 48.57 | nu star (bias corrected) | 42.61 |
| Mean (detects) | 8.52 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 4.795 |
| Maximum | 71 | Median | 2.8 |
| SD | 10.1 | CV | 2.106 |
| k hat (MLE) | 0.326 | k star (bias corrected MLE) | 0.32 |
| Theta hat (MLE) | 14.7 | Theta star (bias corrected MLE) | 14.98 |
| nu hat (MLE) | 33.28 | nu star (bias corrected) | 32.65 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (32.65, α) | 20.59 | Adjusted Chi Square Value (32.65, β) | 20.31 |
| 95% Gamma Approximate UCL (use when n>=50) | 7.604 | 95% Gamma Adjusted UCL (use when n<50) | 7.709 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 5.224 | SD (KM) | 9.594 |
| Variance (KM) | 92.05 | SE of Mean (KM) | 1.412 |
| k hat (KM) | 0.296 | k star (KM) | 0.292 |
| nu hat (KM) | 30.24 | nu star (KM) | 29.8 |
| theta hat (KM) | 17.62 | theta star (KM) | 17.88 |
| 80% gamma percentile (KM) | 7.958 | 90% gamma percentile (KM) | 15.46 |
| 95% gamma percentile (KM) | 24.1 | 99% gamma percentile (KM) | 46.65 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (29.80, α) | 18.33 | Adjusted Chi Square Value (29.80, β) | 18.07 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 8.491 | 95% Gamma Adjusted KM-UCL (use when n<50) | 8.614 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.85 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.905 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.187 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.192 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 5.238 | Mean in Log Scale | 1.22 |
| SD in Original Scale | 9.689 | SD in Log Scale | 0.805 |
| 95% t UCL (assumes normality of ROS data) | 7.512 | 95% Percentile Bootstrap UCL | 7.815 |
| 95% BCA Bootstrap UCL | 9.574 | 95% Bootstrap t UCL | 12.75 |
| 95% H-UCL (Log ROS) | 5.956 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.192 | KM Geo Mean | 3.295 |
| KM SD (logged) | 0.847 | 95% Critical H Value (KM-Log) | 2.156 |
| KM Standard Error of Mean (logged) | 0.165 | 95% H-UCL (KM -Log) | 6.108 |
| KM SD (logged) | 0.847 | 95% Critical H Value (KM-Log) | 2.156 |
| KM Standard Error of Mean (logged) | 0.165 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 5.431 | Mean in Log Scale | 1.312 |
| SD in Original Scale | 9.561 | SD in Log Scale | 0.801 |
| 95% t UCL (Assumes normality) | 7.675 | 95% H-Stat UCL | 6.499 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 6.108

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 40 |
| | | Number of Missing Observations | 0 |
| Minimum | 3.3 | Mean | 47.61 |
| Maximum | 890 | Median | 21.8 |
| SD | 125.6 | Std. Error of Mean | 17.59 |
| Coefficient of Variation | 2.638 | Skewness | 6.309 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.318 | Shapiro Wilk GOF Test |

| | | |
|---|---|---|
| 5% Shapiro Wilk P Value | 0 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.375 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 77.08 | 95% Adjusted-CLT UCL (Chen-1995) | 93.14 |
| | | 95% Modified-t UCL (Johnson-1978) | 79.67 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 3.609 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.794 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.234 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.129 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.739 | k star (bias corrected MLE) | 0.708 |
| Theta hat (MLE) | 64.46 | Theta star (bias corrected MLE) | 67.22 |
| nu hat (MLE) | 75.33 | nu star (bias corrected) | 72.24 |
| MLE Mean (bias corrected) | 47.61 | MLE Sd (bias corrected) | 56.57 |
| | | Approximate Chi Square Value (0.05) | 53.67 |
| Adjusted Level of Significance | 0.0453 | Adjusted Chi Square Value | 53.2 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 64.08 | 95% Adjusted Gamma UCL (use when n<50) | 64.64 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.944 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk P Value | 0.0276 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.107 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data appear Lognormal at 5% Significance Level |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.194 | Mean of logged Data | 3.051 |
| Maximum of Logged Data | 6.791 | SD of logged Data | 1.061 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 52.91 | 90% Chebyshev (MVUE) UCL | 55.89 |
| 95% Chebyshev (MVUE) UCL | 64.69 | 97.5% Chebyshev (MVUE) UCL | 76.9 |
| 99% Chebyshev (MVUE) UCL | 100.9 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 76.54 | 95% Jackknife UCL | 77.08 |
| 95% Standard Bootstrap UCL | 76.43 | 95% Bootstrap-t UCL | 155.3 |
| 95% Hall's Bootstrap UCL | 174.7 | 95% Percentile Bootstrap UCL | 81.38 |
| 95% BCA Bootstrap UCL | 102.3 | | |

| | | | |
|---|---|---|---|
| 90% Chebyshev(Mean, Sd) UCL | 100.4 | 95% Chebyshev(Mean, Sd) UCL | 124.3 |
| 97.5% Chebyshev(Mean, Sd) UCL | 157.4 | 99% Chebyshev(Mean, Sd) UCL | 222.6 |

Suggested UCL to Use

95% H-UCL 52.91

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 13 |
| Number of Detects | 7 | Number of Non-Detects | 43 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | 0.77 | Minimum Non-Detect | 0.19 |
| Maximum Detect | 2100 | Maximum Non-Detect | 2.1 |
| Variance Detects | 728587 | Percent Non-Detects | 86% |
| Mean Detects | 539.3 | SD Detects | 853.6 |
| Median Detects | 110 | CV Detects | 1.583 |
| Skewness Detects | 1.44 | Kurtosis Detects | 0.566 |
| Mean of Logged Detects | 3.657 | SD of Logged Detects | 3.342 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.704 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.386 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 75.72 | KM Standard Error of Mean | 53.45 |
| KM SD | 349.9 | 95% KM (BCA) UCL | 173.9 |
| 95% KM (t) UCL | 165.3 | 95% KM (Percentile Bootstrap) UCL | 166.2 |
| 95% KM (z) UCL | 163.6 | 95% KM Bootstrap t UCL | 928.8 |
| 90% KM Chebyshev UCL | 236.1 | 95% KM Chebyshev UCL | 308.7 |
| 97.5% KM Chebyshev UCL | 409.5 | 99% KM Chebyshev UCL | 607.5 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.41 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.797 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.223 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.338 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.267 | k star (bias corrected MLE) | 0.248 |
| Theta hat (MLE) | 2021 | Theta star (bias corrected MLE) | 2177 |
| nu hat (MLE) | 3.737 | nu star (bias corrected) | 3.469 |
| Mean (detects) | 539.3 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 75.52 |
| Maximum | 2100 | Median | 0.01 |
| SD | 353.5 | CV | 4.681 |
| k hat (MLE) | 0.104 | k star (bias corrected MLE) | 0.111 |
| Theta hat (MLE) | 726.3 | Theta star (bias corrected MLE) | 679.9 |
| nu hat (MLE) | 10.4 | nu star (bias corrected) | 11.11 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (11.11, α) | 4.644 | Adjusted Chi Square Value (11.11, β) | 4.52 |
| 95% Gamma Approximate UCL (use when n>=50) | 180.6 | 95% Gamma Adjusted UCL (use when n<50) | 185.5 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 75.72 | SD (KM) | 349.9 |
| Variance (KM) | 122421 | SE of Mean (KM) | 53.45 |
| k hat (KM) | 0.0468 | k star (KM) | 0.0574 |
| nu hat (KM) | 4.683 | nu star (KM) | 5.735 |
| theta hat (KM) | 1617 | theta star (KM) | 1320 |
| 80% gamma percentile (KM) | 16.04 | 90% gamma percentile (KM) | 136 |
| 95% gamma percentile (KM) | 419.9 | 99% gamma percentile (KM) | 1557 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (5.74, α) | 1.506 | Adjusted Chi Square Value (5.74, β) | 1.443 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 288.3 | 95% Gamma Adjusted KM-UCL (use when n<50) | 300.9 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.882 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.194 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 75.54 | Mean in Log Scale | -8.51 |
| SD in Original Scale | 353.5 | SD in Log Scale | 7.313 |
| 95% t UCL (assumes normality of ROS data) | 159.3 | 95% Percentile Bootstrap UCL | 164.9 |
| 95% BCA Bootstrap UCL | 200.4 | 95% Bootstrap t UCL | 1204 |
| 95% H-UCL (Log ROS) | 1.875E+13 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.805 | KM Geo Mean | 0.447 |
| KM SD (logged) | 2.173 | 95% Critical H Value (KM-Log) | 3.867 |

| | | | |
|---|---|---|---|
| KM Standard Error of Mean (logged) | 0.354 | 95% H-UCL (KM -Log) | 15.75 |
| KM SD (logged) | 2.173 | 95% Critical H Value (KM-Log) | 3.867 |
| KM Standard Error of Mean (logged) | 0.354 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 75.83 | Mean in Log Scale | -0.457 |
| SD in Original Scale | 353.4 | SD in Log Scale | 2.121 |
| 95% t UCL (Assumes normality) | 159.6 | 95% H-Stat UCL | 18.92 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 288.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 8 |
| Number of Detects | 3 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.13 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 0.55 | Maximum Non-Detect | 0.39 |
| Variance Detects | 0.0516 | Percent Non-Detects | 94.12% |
| Mean Detects | 0.29 | SD Detects | 0.227 |
| Median Detects | 0.19 | CV Detects | 0.783 |
| Skewness Detects | 1.597 | Kurtosis Detects | N/A |
| Mean of Logged Detects | -1.433 | SD of Logged Detects | 0.748 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.855 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.337 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.14 | KM Standard Error of Mean | 0.0101 |
| KM SD | 0.0588 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.157 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.156 | 95% KM Bootstrap t UCL | N/A |

| | | | |
|---|---|---|---|
| 90% KM Chebyshev UCL | 0.17 | 95% KM Chebyshev UCL | 0.184 |
| 97.5% KM Chebyshev UCL | 0.203 | 99% KM Chebyshev UCL | 0.241 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.719 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.107 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 16.31 | nu star (bias corrected) | N/A |
| Mean (detects) | 0.29 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.112 |
| Maximum | 0.55 | Median | 0.0917 |
| SD | 0.0942 | CV | 0.84 |
| k hat (MLE) | 1.456 | k star (bias corrected MLE) | 1.384 |
| Theta hat (MLE) | 0.0769 | Theta star (bias corrected MLE) | 0.081 |
| nu hat (MLE) | 148.5 | nu star (bias corrected) | 141.1 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (141.12, α) | 114.7 | Adjusted Chi Square Value (141.12, β) | 114 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.138 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.14 | SD (KM) | 0.0588 |
| Variance (KM) | 0.00346 | SE of Mean (KM) | 0.0101 |
| k hat (KM) | 5.654 | k star (KM) | 5.334 |
| nu hat (KM) | 576.7 | nu star (KM) | 544.1 |
| theta hat (KM) | 0.0247 | theta star (KM) | 0.0262 |
| 80% gamma percentile (KM) | 0.187 | 90% gamma percentile (KM) | 0.221 |
| 95% gamma percentile (KM) | 0.252 | 99% gamma percentile (KM) | 0.317 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (544.10, α) | 491 | Adjusted Chi Square Value (544.10, β) | 489.5 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.155 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.155 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.93 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.286 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.136 | Mean in Log Scale | -2.1 |
| SD in Original Scale | 0.0758 | SD in Log Scale | 0.44 |
| 95% t UCL (assumes normality of ROS data) | 0.154 | 95% Percentile Bootstrap UCL | 0.155 |

| | | | |
|---|---|---|---|
| 95% BCA Bootstrap UCL | 0.16 | 95% Bootstrap t UCL | 0.163 |
| 95% H-UCL (Log ROS) | 0.151 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.002 | KM Geo Mean | 0.135 |
| KM SD (logged) | 0.208 | 95% Critical H Value (KM-Log) | 1.719 |
| KM Standard Error of Mean (logged) | 0.0361 | 95% H-UCL (KM -Log) | 0.145 |
| KM SD (logged) | 0.208 | 95% Critical H Value (KM-Log) | 1.719 |
| KM Standard Error of Mean (logged) | 0.0361 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.116 | Mean in Log Scale | -2.27 |
| SD in Original Scale | 0.0759 | SD in Log Scale | 0.428 |
| 95% t UCL (Assumes normality) | 0.134 | 95% H-Stat UCL | 0.126 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.157

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 7 |
| Number of Detects | 2 | Number of Non-Detects | 49 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.088 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 0.34 | Maximum Non-Detect | 0.78 |
| Variance Detects | 0.0318 | Percent Non-Detects | 96.08% |
| Mean Detects | 0.214 | SD Detects | 0.178 |
| Median Detects | 0.214 | CV Detects | 0.833 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | -1.755 | SD of Logged Detects | 0.956 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0945 | KM Standard Error of Mean | 0.00902 |
| KM SD | 0.0398 | 95% KM (BCA) UCL | N/A |

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 0.11 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.109 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.122 | 95% KM Chebyshev UCL | 0.134 |
| 97.5% KM Chebyshev UCL | 0.151 | 99% KM Chebyshev UCL | 0.184 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.503 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0855 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 10.01 | nu star (bias corrected) | N/A |
| Mean (detects) | 0.214 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0945 | SD (KM) | 0.0398 |
| Variance (KM) | 0.00159 | SE of Mean (KM) | 0.00902 |
| k hat (KM) | 5.624 | k star (KM) | 5.306 |
| nu hat (KM) | 573.7 | nu star (KM) | 541.2 |
| theta hat (KM) | 0.0168 | theta star (KM) | 0.0178 |
| 80% gamma percentile (KM) | 0.126 | 90% gamma percentile (KM) | 0.149 |
| 95% gamma percentile (KM) | 0.17 | 99% gamma percentile (KM) | 0.215 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0453 |
| Approximate Chi Square Value (541.25, α) | 488.3 | Adjusted Chi Square Value (541.25, β) | 486.8 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.105 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.105 |

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.103 | Mean in Log Scale | -2.408 |
| SD in Original Scale | 0.0578 | SD in Log Scale | 0.517 |
| 95% t UCL (assumes normality of ROS data) | 0.116 | 95% Percentile Bootstrap UCL | 0.116 |
| 95% BCA Bootstrap UCL | 0.119 | 95% Bootstrap t UCL | 0.12 |
| 95% H-UCL (Log ROS) | 0.118 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.396 | KM Geo Mean | 0.0911 |
| KM SD (logged) | 0.214 | 95% Critical H Value (KM-Log) | 1.72 |
| KM Standard Error of Mean (logged) | 0.0484 | 95% H-UCL (KM -Log) | 0.0982 |
| KM SD (logged) | 0.214 | 95% Critical H Value (KM-Log) | 1.72 |
| KM Standard Error of Mean (logged) | 0.0484 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.135 | Mean in Log Scale | -2.207 |
| SD in Original Scale | 0.106 | SD in Log Scale | 0.572 |
| 95% t UCL (Assumes normality) | 0.159 | 95% H-Stat UCL | 0.151 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 0.134

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | benzo(b)fluoranthene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 8 |
| Number of Detects | 3 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.11 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 0.32 | Maximum Non-Detect | 0.75 |
| Variance Detects | 0.0111 | Percent Non-Detects | 94.12% |
| Mean Detects | 0.21 | SD Detects | 0.105 |
| Median Detects | 0.2 | CV Detects | 0.502 |
| Skewness Detects | 0.423 | Kurtosis Detects | N/A |
| Mean of Logged Detects | -1.652 | SD of Logged Detects | 0.535 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.993 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.204 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.118 | KM Standard Error of Mean | 0.00701 |
| KM SD | 0.0358 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.129 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.129 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.139 | 95% KM Chebyshev UCL | 0.148 |
| 97.5% KM Chebyshev UCL | 0.161 | 99% KM Chebyshev UCL | 0.187 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 5.632 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0373 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 33.79 | nu star (bias corrected) | N/A |
| Mean (detects) | 0.21 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.0172 | Mean | 0.113 |
| Maximum | 0.32 | Median | 0.106 |
| SD | 0.0564 | CV | 0.5 |
| k hat (MLE) | 3.9 | k star (bias corrected MLE) | 3.683 |
| Theta hat (MLE) | 0.0289 | Theta star (bias corrected MLE) | 0.0306 |
| nu hat (MLE) | 397.8 | nu star (bias corrected) | 375.7 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (375.69, α) | 331.8 | Adjusted Chi Square Value (375.69, β) | 330.6 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.128 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.118 | SD (KM) | 0.0358 |
| Variance (KM) | 0.00128 | SE of Mean (KM) | 0.00701 |
| k hat (KM) | 10.83 | k star (KM) | 10.2 |
| nu hat (KM) | 1104 | nu star (KM) | 1041 |
| theta hat (KM) | 0.0109 | theta star (KM) | 0.0115 |
| 80% gamma percentile (KM) | 0.147 | 90% gamma percentile (KM) | 0.167 |
| 95% gamma percentile (KM) | 0.184 | 99% gamma percentile (KM) | 0.22 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (N/A, α) | 966.9 | Adjusted Chi Square Value (N/A, β) | 964.8 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.127 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.127 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.995 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.198 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.119 | Mean in Log Scale | -2.202 |
| SD in Original Scale | 0.0479 | SD in Log Scale | 0.373 |
| 95% t UCL (assumes normality of ROS data) | 0.13 | 95% Percentile Bootstrap UCL | 0.13 |
| 95% BCA Bootstrap UCL | 0.131 | 95% Bootstrap t UCL | 0.132 |
| 95% H-UCL (Log ROS) | 0.13 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.165 | KM Geo Mean | 0.115 |
| KM SD (logged) | 0.191 | 95% Critical H Value (KM-Log) | 1.716 |
| KM Standard Error of Mean (logged) | 0.0375 | 95% H-UCL (KM -Log) | 0.122 |
| KM SD (logged) | 0.191 | 95% Critical H Value (KM-Log) | 1.716 |
| KM Standard Error of Mean (logged) | 0.0375 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.148 | Mean in Log Scale | -2.135 |
| SD in Original Scale | 0.114 | SD in Log Scale | 0.63 |
| 95% t UCL (Assumes normality) | 0.175 | 95% H-Stat UCL | 0.172 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.129

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | beryllium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 4 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | beryllium | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | cadmium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 8 |
| Number of Detects | 5 | Number of Non-Detects | 46 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.3 | Minimum Non-Detect | 0.24 |
| Maximum Detect | 5 | Maximum Non-Detect | 10 |
| Variance Detects | 4.127 | Percent Non-Detects | 90.2% |
| Mean Detects | 1.38 | SD Detects | 2.032 |
| Median Detects | 0.6 | CV Detects | 1.472 |
| Skewness Detects | 2.193 | Kurtosis Detects | 4.846 |
| Mean of Logged Detects | -0.333 | SD of Logged Detects | 1.154 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.628 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.431 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.452 | KM Standard Error of Mean | 0.124 |
| KM SD | 0.678 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.661 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.657 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.825 | 95% KM Chebyshev UCL | 0.994 |
| 97.5% KM Chebyshev UCL | 1.229 | 99% KM Chebyshev UCL | 1.689 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.751 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.694 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.381 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.365 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.893 | k star (bias corrected MLE) | 0.491 |
| Theta hat (MLE) | 1.545 | Theta star (bias corrected MLE) | 2.813 |
| nu hat (MLE) | 8.93 | nu star (bias corrected) | 4.905 |
| Mean (detects) | 1.38 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.395 |
| Maximum | 5 | Median | 0.01 |
| SD | 0.868 | CV | 2.198 |
| k hat (MLE) | 0.323 | k star (bias corrected MLE) | 0.317 |
| Theta hat (MLE) | 1.222 | Theta star (bias corrected MLE) | 1.245 |
| nu hat (MLE) | 32.96 | nu star (bias corrected) | 32.36 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (32.36, α) | 20.36 | Adjusted Chi Square Value (32.36, β) | 20.08 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.628 | 95% Gamma Adjusted UCL (use when n<50) | 0.636 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.452 | SD (KM) | 0.678 |
| Variance (KM) | 0.46 | SE of Mean (KM) | 0.124 |
| k hat (KM) | 0.445 | k star (KM) | 0.432 |
| nu hat (KM) | 45.35 | nu star (KM) | 44.02 |
| theta hat (KM) | 1.017 | theta star (KM) | 1.048 |
| 80% gamma percentile (KM) | 0.736 | 90% gamma percentile (KM) | 1.26 |
| 95% gamma percentile (KM) | 1.83 | 99% gamma percentile (KM) | 3.253 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (44.02, α) | 29.8 | Adjusted Chi Square Value (44.02, β) | 29.46 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.668 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.676 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.808 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data appear Lognormal at 5% Significance Level |

| | | | |
|---|---|---|---|
| Lilliefors Test Statistic | 0.308 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.399 | Mean in Log Scale | -1.704 |
| SD in Original Scale | 0.745 | SD in Log Scale | 1.234 |
| 95% t UCL (assumes normality of ROS data) | 0.574 | 95% Percentile Bootstrap UCL | 0.582 |
| 95% BCA Bootstrap UCL | 0.68 | 95% Bootstrap t UCL | 0.792 |
| 95% H-UCL (Log ROS) | 0.61 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.067 | KM Geo Mean | 0.344 |
| KM SD (logged) | 0.56 | 95% Critical H Value (KM-Log) | 1.917 |
| KM Standard Error of Mean (logged) | 0.17 | 95% H-UCL (KM -Log) | 0.468 |
| KM SD (logged) | 0.56 | 95% Critical H Value (KM-Log) | 1.917 |
| KM Standard Error of Mean (logged) | 0.17 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.251 | Mean in Log Scale | -0.0378 |
| SD in Original Scale | 1.02 | SD in Log Scale | 0.797 |
| 95% t UCL (Assumes normality) | 1.49 | 95% H-Stat UCL | 1.678 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 0.468

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | chloroform | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 7 |
| Number of Detects | 1 | Number of Non-Detects | 49 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 6 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | chloroform | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 21 |
| Number of Detects | 19 | Number of Non-Detects | 32 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.78 | Minimum Non-Detect | 0.53 |
| Maximum Detect | 33 | Maximum Non-Detect | 10 |
| Variance Detects | 81.19 | Percent Non-Detects | 62.75% |
| Mean Detects | 6.694 | SD Detects | 9.01 |
| Median Detects | 1.8 | CV Detects | 1.346 |
| Skewness Detects | 1.849 | Kurtosis Detects | 3 |
| Mean of Logged Detects | 1.135 | SD of Logged Detects | 1.237 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.704 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.307 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 3.15 | KM Standard Error of Mean | 0.874 |
| KM SD | 6.032 | 95% KM (BCA) UCL | 4.96 |
| 95% KM (t) UCL | 4.615 | 95% KM (Percentile Bootstrap) UCL | 4.701 |
| 95% KM (z) UCL | 4.587 | 95% KM Bootstrap t UCL | 5.701 |
| 90% KM Chebyshev UCL | 5.772 | 95% KM Chebyshev UCL | 6.959 |
| 97.5% KM Chebyshev UCL | 8.607 | 99% KM Chebyshev UCL | 11.84 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.32 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.778 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.264 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.206 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.777 | k star (bias corrected MLE) | 0.689 |
| Theta hat (MLE) | 8.615 | Theta star (bias corrected MLE) | 9.71 |
| nu hat (MLE) | 29.53 | nu star (bias corrected) | 26.2 |
| Mean (detects) | 6.694 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 3.095 |
| Maximum | 33 | Median | 0.8 |
| SD | 6.28 | CV | 2.029 |
| k hat (MLE) | 0.268 | k star (bias corrected MLE) | 0.265 |
| Theta hat (MLE) | 11.56 | Theta star (bias corrected MLE) | 11.68 |
| nu hat (MLE) | 27.31 | nu star (bias corrected) | 27.04 |
| Adjusted Level of Significance (β) | 0.0453 | | |

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (27.04, α) | 16.18 | Adjusted Chi Square Value (27.04, β) | 15.93 |
| 95% Gamma Approximate UCL (use when n>=50) | 5.172 | 95% Gamma Adjusted UCL (use when n<50) | 5.251 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 3.15 | SD (KM) | 6.032 |
| Variance (KM) | 36.38 | SE of Mean (KM) | 0.874 |
| k hat (KM) | 0.273 | k star (KM) | 0.27 |
| nu hat (KM) | 27.82 | nu star (KM) | 27.52 |
| theta hat (KM) | 11.55 | theta star (KM) | 11.68 |
| 80% gamma percentile (KM) | 4.691 | 90% gamma percentile (KM) | 9.397 |
| 95% gamma percentile (KM) | 14.9 | 99% gamma percentile (KM) | 29.4 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (27.52, α) | 16.55 | Adjusted Chi Square Value (27.52, β) | 16.3 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 5.237 | 95% Gamma Adjusted KM-UCL (use when n<50) | 5.317 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.883 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.218 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 3.15 | Mean in Log Scale | 0.0804 |
| SD in Original Scale | 6.136 | SD in Log Scale | 1.434 |
| 95% t UCL (assumes normality of ROS data) | 4.59 | 95% Percentile Bootstrap UCL | 4.644 |
| 95% BCA Bootstrap UCL | 5.469 | 95% Bootstrap t UCL | 5.76 |
| 95% H-UCL (Log ROS) | 5.344 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.354 | KM Geo Mean | 1.425 |
| KM SD (logged) | 1.039 | 95% Critical H Value (KM-Log) | 2.347 |
| KM Standard Error of Mean (logged) | 0.173 | 95% H-UCL (KM -Log) | 3.454 |
| KM SD (logged) | 1.039 | 95% Critical H Value (KM-Log) | 2.347 |
| KM Standard Error of Mean (logged) | 0.173 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 3.857 | Mean in Log Scale | 0.771 |
| SD in Original Scale | 5.893 | SD in Log Scale | 1.03 |
| 95% t UCL (Assumes normality) | 5.239 | 95% H-Stat UCL | 5.168 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 6.959

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | cis-1,2-dichloroethene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 10 |
| Number of Detects | 8 | Number of Non-Detects | 42 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.37 | Minimum Non-Detect | 0.18 |
| Maximum Detect | 54.5 | Maximum Non-Detect | 0.8 |
| Variance Detects | 356.7 | Percent Non-Detects | 84% |
| Mean Detects | 29.26 | SD Detects | 18.89 |
| Median Detects | 22 | CV Detects | 0.645 |
| Skewness Detects | 0.0967 | Kurtosis Detects | -1.094 |
| Mean of Logged Detects | 2.858 | SD of Logged Detects | 1.619 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.9 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.275 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 4.845 | KM Standard Error of Mean | 1.933 |
| KM SD | 12.79 | 95% KM (BCA) UCL | 7.956 |
| 95% KM (t) UCL | 8.086 | 95% KM (Percentile Bootstrap) UCL | 7.84 |
| 95% KM (z) UCL | 8.025 | 95% KM Bootstrap t UCL | 8.562 |
| 90% KM Chebyshev UCL | 10.64 | 95% KM Chebyshev UCL | 13.27 |
| 97.5% KM Chebyshev UCL | 16.92 | 99% KM Chebyshev UCL | 24.08 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.84 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.734 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.319 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.301 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.102 | k star (bias corrected MLE) | 0.772 |
| Theta hat (MLE) | 26.56 | Theta star (bias corrected MLE) | 37.9 |
| nu hat (MLE) | 17.63 | nu star (bias corrected) | 12.35 |
| Mean (detects) | 29.26 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 4.976 |

| | | | |
|---|---|---|---|
| Maximum | 54.5 | Median | 0.01 |
| SD | 12.93 | CV | 2.599 |
| k hat (MLE) | 0.163 | k star (bias corrected MLE) | 0.167 |
| Theta hat (MLE) | 30.52 | Theta star (bias corrected MLE) | 29.87 |
| nu hat (MLE) | 16.3 | nu star (bias corrected) | 16.66 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (16.66, α) | 8.428 | Adjusted Chi Square Value (16.66, β) | 8.254 |
| 95% Gamma Approximate UCL (use when n>=50) | 9.835 | 95% Gamma Adjusted UCL (use when n<50) | 10.04 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 4.845 | SD (KM) | 12.79 |
| Variance (KM) | 163.5 | SE of Mean (KM) | 1.933 |
| k hat (KM) | 0.144 | k star (KM) | 0.148 |
| nu hat (KM) | 14.36 | nu star (KM) | 14.83 |
| theta hat (KM) | 33.74 | theta star (KM) | 32.66 |
| 80% gamma percentile (KM) | 5.226 | 90% gamma percentile (KM) | 14.34 |
| 95% gamma percentile (KM) | 26.72 | 99% gamma percentile (KM) | 62.73 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (14.83, α) | 7.146 | Adjusted Chi Square Value (14.83, β) | 6.987 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 10.06 | 95% Gamma Adjusted KM-UCL (use when n<50) | 10.29 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.662 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.383 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 5.006 | Mean in Log Scale | -1.879 |
| SD in Original Scale | 12.87 | SD in Log Scale | 3.049 |
| 95% t UCL (assumes normality of ROS data) | 8.058 | 95% Percentile Bootstrap UCL | 8.167 |
| 95% BCA Bootstrap UCL | 8.918 | 95% Bootstrap t UCL | 10.22 |
| 95% H-UCL (Log ROS) | 150.8 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.936 | KM Geo Mean | 0.392 |
| KM SD (logged) | 1.772 | 95% Critical H Value (KM-Log) | 3.304 |
| KM Standard Error of Mean (logged) | 0.273 | 95% H-UCL (KM -Log) | 4.352 |
| KM SD (logged) | 1.772 | 95% Critical H Value (KM-Log) | 3.304 |
| KM Standard Error of Mean (logged) | 0.273 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 4.966 | Mean in Log Scale | -0.54 |
| SD in Original Scale | 12.87 | SD in Log Scale | 1.691 |
| 95% t UCL (Assumes normality) | 8.018 | 95% H-Stat UCL | 5.259 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 8.086

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 14 |
| Number of Detects | 13 | Number of Non-Detects | 38 |
| Number of Distinct Detects | 11 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 1.3 | Minimum Non-Detect | 0.15 |
| Maximum Detect | 42 | Maximum Non-Detect | 13 |
| Variance Detects | 123.4 | Percent Non-Detects | 74.51% |
| Mean Detects | 7.2 | SD Detects | 11.11 |
| Median Detects | 2.3 | CV Detects | 1.543 |
| Skewness Detects | 2.946 | Kurtosis Detects | 9.425 |
| Mean of Logged Detects | 1.311 | SD of Logged Detects | 1.09 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.572 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.298 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 3.286 | KM Standard Error of Mean | 1.07 |
| KM SD | 6.385 | 95% KM (BCA) UCL | 5.194 |
| 95% KM (t) UCL | 5.079 | 95% KM (Percentile Bootstrap) UCL | 5.142 |
| 95% KM (z) UCL | 5.046 | 95% KM Bootstrap t UCL | 6.395 |
| 90% KM Chebyshev UCL | 6.495 | 95% KM Chebyshev UCL | 7.949 |
| 97.5% KM Chebyshev UCL | 9.966 | 99% KM Chebyshev UCL | 13.93 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.102 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.763 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.238 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.244 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.883 | k star (bias corrected MLE) | 0.731 |
| Theta hat (MLE) | 8.15 | Theta star (bias corrected MLE) | 9.851 |
| nu hat (MLE) | 22.97 | nu star (bias corrected) | 19 |
| Mean (detects) | 7.2 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 3.361 |
| Maximum | 42 | Median | 0.01 |
| SD | 6.969 | CV | 2.073 |
| k hat (MLE) | 0.246 | k star (bias corrected MLE) | 0.245 |
| Theta hat (MLE) | 13.64 | Theta star (bias corrected MLE) | 13.72 |
| nu hat (MLE) | 25.13 | nu star (bias corrected) | 24.98 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (24.98, α) | 14.6 | Adjusted Chi Square Value (24.98, β) | 14.37 |
| 95% Gamma Approximate UCL (use when n>=50) | 5.752 | 95% Gamma Adjusted UCL (use when n<50) | 5.845 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 3.286 | SD (KM) | 6.385 |
| Variance (KM) | 40.77 | SE of Mean (KM) | 1.07 |
| k hat (KM) | 0.265 | k star (KM) | 0.262 |
| nu hat (KM) | 27.02 | nu star (KM) | 26.76 |
| theta hat (KM) | 12.41 | theta star (KM) | 12.52 |
| 80% gamma percentile (KM) | 4.852 | 90% gamma percentile (KM) | 9.827 |
| 95% gamma percentile (KM) | 15.68 | 99% gamma percentile (KM) | 31.15 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (26.76, α) | 15.97 | Adjusted Chi Square Value (26.76, β) | 15.73 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 5.508 | 95% Gamma Adjusted KM-UCL (use when n<50) | 5.593 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.855 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.225 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 3.298 | Mean in Log Scale | 0.329 |
| SD in Original Scale | 6.338 | SD in Log Scale | 1.289 |
| 95% t UCL (assumes normality of ROS data) | 4.785 | 95% Percentile Bootstrap UCL | 4.86 |
| 95% BCA Bootstrap UCL | 5.856 | 95% Bootstrap t UCL | 6.35 |
| 95% H-UCL (Log ROS) | 5.147 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.0744 | KM Geo Mean | 1.077 |
| KM SD (logged) | 1.563 | 95% Critical H Value (KM-Log) | 2.96 |
| KM Standard Error of Mean (logged) | 0.361 | 95% H-UCL (KM -Log) | 7.035 |
| KM SD (logged) | 1.563 | 95% Critical H Value (KM-Log) | 2.96 |
| KM Standard Error of Mean (logged) | 0.361 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 5.39 | Mean in Log Scale | 1.059 |

| | | | |
|---|---|---|---|
| SD in Original Scale | 6.031 | SD in Log Scale | 1.467 |
| 95% t UCL (Assumes normality) | 6.805 | 95% H-Stat UCL | 15.25 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM Approximate Gamma UCL | 5.508 |

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 12 |
| Number of Detects | 7 | Number of Non-Detects | 44 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.19 | Minimum Non-Detect | 0.23 |
| Maximum Detect | 3.6 | Maximum Non-Detect | 0.44 |
| Variance Detects | 1.409 | Percent Non-Detects | 86.27% |
| Mean Detects | 1.03 | SD Detects | 1.187 |
| Median Detects | 0.62 | CV Detects | 1.153 |
| Skewness Detects | 2.202 | Kurtosis Detects | 5.056 |
| Mean of Logged Detects | -0.401 | SD of Logged Detects | 0.956 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.707 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.333 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.319 | KM Standard Error of Mean | 0.0768 |
| KM SD | 0.498 | 95% KM (BCA) UCL | 0.508 |
| 95% KM (t) UCL | 0.448 | 95% KM (Percentile Bootstrap) UCL | 0.464 |
| 95% KM (z) UCL | 0.446 | 95% KM Bootstrap t UCL | 0.596 |
| 90% KM Chebyshev UCL | 0.55 | 95% KM Chebyshev UCL | 0.654 |
| 97.5% KM Chebyshev UCL | 0.799 | 99% KM Chebyshev UCL | 1.084 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.436 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.724 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.275 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.318 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.302 | k star (bias corrected MLE) | 0.839 |
| Theta hat (MLE) | 0.791 | Theta star (bias corrected MLE) | 1.227 |
| nu hat (MLE) | 18.23 | nu star (bias corrected) | 11.75 |
| Mean (detects) | 1.03 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.195 |
| Maximum | 3.6 | Median | 0.01 |
| SD | 0.547 | CV | 2.808 |
| k hat (MLE) | 0.352 | k star (bias corrected MLE) | 0.344 |
| Theta hat (MLE) | 0.555 | Theta star (bias corrected MLE) | 0.567 |
| nu hat (MLE) | 35.86 | nu star (bias corrected) | 35.08 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (35.08, α) | 22.53 | Adjusted Chi Square Value (35.08, β) | 22.24 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.304 | 95% Gamma Adjusted UCL (use when n<50) | 0.308 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.319 | SD (KM) | 0.498 |
| Variance (KM) | 0.248 | SE of Mean (KM) | 0.0768 |
| k hat (KM) | 0.412 | k star (KM) | 0.401 |
| nu hat (KM) | 42.03 | nu star (KM) | 40.89 |
| theta hat (KM) | 0.775 | theta star (KM) | 0.797 |
| 80% gamma percentile (KM) | 0.516 | 90% gamma percentile (KM) | 0.902 |
| 95% gamma percentile (KM) | 1.326 | 99% gamma percentile (KM) | 2.393 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (40.89, α) | 27.24 | Adjusted Chi Square Value (40.89, β) | 26.91 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.48 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.485 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.962 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.214 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.296 | Mean in Log Scale | -1.759 |
| SD in Original Scale | 0.52 | SD in Log Scale | 0.952 |
| 95% t UCL (assumes normality of ROS data) | 0.418 | 95% Percentile Bootstrap UCL | 0.43 |
| 95% BCA Bootstrap UCL | 0.516 | 95% Bootstrap t UCL | 0.633 |
| 95% H-UCL (Log ROS) | 0.367 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.431 | KM Geo Mean | 0.239 |
| KM SD (logged) | 0.55 | 95% Critical H Value (KM-Log) | 1.91 |
| KM Standard Error of Mean (logged) | 0.104 | 95% H-UCL (KM -Log) | 0.323 |
| KM SD (logged) | 0.55 | 95% Critical H Value (KM-Log) | 1.91 |
| KM Standard Error of Mean (logged) | 0.104 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.303 | Mean in Log Scale | -1.513 |
| SD in Original Scale | 0.506 | SD in Log Scale | 0.582 |
| 95% t UCL (Assumes normality) | 0.421 | 95% H-Stat UCL | 0.306 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 0.48

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 16 |
| Number of Detects | 15 | Number of Non-Detects | 35 |
| Number of Distinct Detects | 13 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 2.9 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 1300 | Maximum Non-Detect | 0.8 |
| Variance Detects | 144073 | Percent Non-Detects | 70% |
| Mean Detects | 523.8 | SD Detects | 379.6 |
| Median Detects | 490 | CV Detects | 0.725 |
| Skewness Detects | 0.844 | Kurtosis Detects | 1.074 |
| Mean of Logged Detects | 5.547 | SD of Logged Detects | 1.916 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.858 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.256 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.22 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 157.3 | KM Standard Error of Mean | 45.81 |
| KM SD | 312.9 | 95% KM (BCA) UCL | 242.6 |
| 95% KM (t) UCL | 234.1 | 95% KM (Percentile Bootstrap) UCL | 235.7 |
| 95% KM (z) UCL | 232.6 | 95% KM Bootstrap t UCL | 256.9 |
| 90% KM Chebyshev UCL | 294.7 | 95% KM Chebyshev UCL | 356.9 |
| 97.5% KM Chebyshev UCL | 443.3 | 99% KM Chebyshev UCL | 613 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.649 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.771 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.348 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.23 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.828 | k star (bias corrected MLE) | 0.706 |
| Theta hat (MLE) | 633 | Theta star (bias corrected MLE) | 741.4 |
| nu hat (MLE) | 24.83 | nu star (bias corrected) | 21.19 |
| Mean (detects) | 523.8 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 160.2 |
| Maximum | 1300 | Median | 0.01 |
| SD | 314.9 | CV | 1.966 |
| k hat (MLE) | 0.128 | k star (bias corrected MLE) | 0.134 |
| Theta hat (MLE) | 1250 | Theta star (bias corrected MLE) | 1197 |
| nu hat (MLE) | 12.81 | nu star (bias corrected) | 13.38 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (13.38, α) | 6.148 | Adjusted Chi Square Value (13.38, β) | 6.002 |
| 95% Gamma Approximate UCL (use when n>=50) | 348.6 | 95% Gamma Adjusted UCL (use when n<50) | 357.1 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 157.3 | SD (KM) | 312.9 |
| Variance (KM) | 97913 | SE of Mean (KM) | 45.81 |
| k hat (KM) | 0.253 | k star (KM) | 0.251 |
| nu hat (KM) | 25.26 | nu star (KM) | 25.08 |
| theta hat (KM) | 622.5 | theta star (KM) | 627.1 |
| 80% gamma percentile (KM) | 228.7 | 90% gamma percentile (KM) | 472 |
| 95% gamma percentile (KM) | 760.6 | 99% gamma percentile (KM) | 1528 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (25.08, α) | 14.67 | Adjusted Chi Square Value (25.08, β) | 14.44 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 268.8 | 95% Gamma Adjusted KM-UCL (use when n<50) | 273.2 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.662 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.386 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.22 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 162 | Mean in Log Scale | 2.267 |

| | | | |
|---|---|---|---|
| SD in Original Scale | 313.8 | SD in Log Scale | 2.823 |
| 95% t UCL (assumes normality of ROS data) | 236.4 | 95% Percentile Bootstrap UCL | 241.3 |
| 95% BCA Bootstrap UCL | 252.4 | 95% Bootstrap t UCL | 261.1 |
| 95% H-UCL (Log ROS) | 3624 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.538 | KM Geo Mean | 1.712 |
| KM SD (logged) | 3.433 | 95% Critical H Value (KM-Log) | 5.74 |
| KM Standard Error of Mean (logged) | 0.503 | 95% H-UCL (KM -Log) | 10344 |
| KM SD (logged) | 3.433 | 95% Critical H Value (KM-Log) | 5.74 |
| KM Standard Error of Mean (logged) | 0.503 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 157.4 | Mean in Log Scale | 0.778 |
| SD in Original Scale | 316 | SD in Log Scale | 3.354 |
| 95% t UCL (Assumes normality) | 232.3 | 95% H-Stat UCL | 8903 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (Chebyshev) UCL | 356.9 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 37 |
| Number of Detects | 41 | Number of Non-Detects | 10 |
| Number of Distinct Detects | 35 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 19.8 | Minimum Non-Detect | 25 |
| Maximum Detect | 100000 | Maximum Non-Detect | 80 |
| Variance Detects | 3.002E+8 | Percent Non-Detects | 19.61% |
| Mean Detects | 10196 | SD Detects | 17326 |
| Median Detects | 4100 | CV Detects | 1.699 |
| Skewness Detects | 3.797 | Kurtosis Detects | 18.09 |
| Mean of Logged Detects | 7.819 | SD of Logged Detects | 2.157 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.592 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.941 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.278 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.137 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 8203 | KM Standard Error of Mean | 2249 |
| KM SD | 15867 | 95% KM (BCA) UCL | 12277 |
| 95% KM (t) UCL | 11972 | 95% KM (Percentile Bootstrap) UCL | 11949 |
| 95% KM (z) UCL | 11902 | 95% KM Bootstrap t UCL | 14843 |
| 90% KM Chebyshev UCL | 14951 | 95% KM Chebyshev UCL | 18007 |
| 97.5% KM Chebyshev UCL | 22250 | 99% KM Chebyshev UCL | 30583 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.236 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.823 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.0764 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.147 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.457 | k star (bias corrected MLE) | 0.44 |
| Theta hat (MLE) | 22322 | Theta star (bias corrected MLE) | 23193 |
| nu hat (MLE) | 37.46 | nu star (bias corrected) | 36.05 |
| Mean (detects) | 10196 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 8197 |
| Maximum | 100000 | Median | 1680 |
| SD | 16027 | CV | 1.955 |
| k hat (MLE) | 0.202 | k star (bias corrected MLE) | 0.204 |
| Theta hat (MLE) | 40489 | Theta star (bias corrected MLE) | 40258 |
| nu hat (MLE) | 20.65 | nu star (bias corrected) | 20.77 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (20.77, α) | 11.42 | Adjusted Chi Square Value (20.77, β) | 11.22 |
| 95% Gamma Approximate UCL (use when n>=50) | 14907 | 95% Gamma Adjusted UCL (use when n<50) | 15176 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 8203 | SD (KM) | 15867 |
| Variance (KM) | 2.517E+8 | SE of Mean (KM) | 2249 |
| k hat (KM) | 0.267 | k star (KM) | 0.265 |
| nu hat (KM) | 27.26 | nu star (KM) | 26.99 |
| theta hat (KM) | 30691 | theta star (KM) | 30998 |
| 80% gamma percentile (KM) | 12143 | 90% gamma percentile (KM) | 24510 |
| 95% gamma percentile (KM) | 39029 | 99% gamma percentile (KM) | 77379 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (26.99, α) | 16.14 | Adjusted Chi Square Value (26.99, β) | 15.9 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 13713 | 95% Gamma Adjusted KM-UCL (use when n<50) | 13925 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.938 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.941 | Detected Data Not Lognormal at 5% Significance Level |

| | | | |
|---|---|---|---|
| Lilliefors Test Statistic | 0.134 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.137 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 8209 | Mean in Log Scale | 7.016 |
| SD in Original Scale | 16021 | SD in Log Scale | 2.572 |
| 95% t UCL (assumes normality of ROS data) | 11969 | 95% Percentile Bootstrap UCL | 12150 |
| 95% BCA Bootstrap UCL | 13574 | 95% Bootstrap t UCL | 15065 |
| 95% H-UCL (Log ROS) | 147067 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 6.932 | KM Geo Mean | 1025 |
| KM SD (logged) | 2.629 | 95% Critical H Value (KM-Log) | 4.412 |
| KM Standard Error of Mean (logged) | 0.375 | 95% H-UCL (KM -Log) | 167560 |
| KM SD (logged) | 2.629 | 95% Critical H Value (KM-Log) | 4.412 |
| KM Standard Error of Mean (logged) | 0.375 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 8203 | Mean in Log Scale | 6.964 |
| SD in Original Scale | 16024 | SD in Log Scale | 2.613 |
| 95% t UCL (Assumes normality) | 11964 | 95% H-Stat UCL | 162370 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 13713

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 18 |
| Number of Detects | 16 | Number of Non-Detects | 34 |
| Number of Distinct Detects | 15 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.47 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 91 | Maximum Non-Detect | 0.8 |
| Variance Detects | 809.4 | Percent Non-Detects | 68% |
| Mean Detects | 52.5 | SD Detects | 28.45 |
| Median Detects | 54.5 | CV Detects | 0.542 |
| Skewness Detects | -0.75 | Kurtosis Detects | -0.0803 |
| Mean of Logged Detects | 3.39 | SD of Logged Detects | 1.707 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | Shapiro Wilk GOF Test | |

| | | |
|---|---|---|
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.257 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 16.99 | KM Standard Error of Mean | 4.224 |
| KM SD | 28.92 | 95% KM (BCA) UCL | 24.21 |
| 95% KM (t) UCL | 24.08 | 95% KM (Percentile Bootstrap) UCL | 23.85 |
| 95% KM (z) UCL | 23.94 | 95% KM Bootstrap t UCL | 25.06 |
| 90% KM Chebyshev UCL | 29.67 | 95% KM Chebyshev UCL | 35.41 |
| 97.5% KM Chebyshev UCL | 43.37 | 99% KM Chebyshev UCL | 59.02 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.397 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.763 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.415 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.221 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.01 | k star (bias corrected MLE) | 0.862 |
| Theta hat (MLE) | 52.01 | Theta star (bias corrected MLE) | 60.91 |
| nu hat (MLE) | 32.31 | nu star (bias corrected) | 27.58 |
| Mean (detects) | 52.5 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 21.72 |
| Maximum | 91 | Median | 8.562 |
| SD | 27.39 | CV | 1.261 |
| k hat (MLE) | 0.31 | k star (bias corrected MLE) | 0.305 |
| Theta hat (MLE) | 69.99 | Theta star (bias corrected MLE) | 71.21 |
| nu hat (MLE) | 31.03 | nu star (bias corrected) | 30.5 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (30.50, α) | 18.89 | Adjusted Chi Square Value (30.50, β) | 18.62 |
| 95% Gamma Approximate UCL (use when n>=50) | 35.07 | 95% Gamma Adjusted UCL (use when n<50) | 35.59 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 16.99 | SD (KM) | 28.92 |
| Variance (KM) | 836.2 | SE of Mean (KM) | 4.224 |
| k hat (KM) | 0.345 | k star (KM) | 0.338 |
| nu hat (KM) | 34.54 | nu star (KM) | 33.8 |
| theta hat (KM) | 49.21 | theta star (KM) | 50.28 |
| 80% gamma percentile (KM) | 26.74 | 90% gamma percentile (KM) | 49.33 |
| 95% gamma percentile (KM) | 74.77 | 99% gamma percentile (KM) | 139.9 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (33.80, α) | 21.5 | Adjusted Chi Square Value (33.80, β) | 21.21 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 26.71 | 95% Gamma Adjusted KM-UCL (use when n<50) | 27.08 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.606 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.426 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 17.84 | Mean in Log Scale | 0.767 |
| SD in Original Scale | 28.76 | SD in Log Scale | 2.412 |
| 95% t UCL (assumes normality of ROS data) | 24.66 | 95% Percentile Bootstrap UCL | 24.36 |
| 95% BCA Bootstrap UCL | 25.56 | 95% Bootstrap t UCL | 25.48 |
| 95% H-UCL (Log ROS) | 168.5 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.167 | KM Geo Mean | 1.182 |
| KM SD (logged) | 2.423 | 95% Critical H Value (KM-Log) | 4.227 |
| KM Standard Error of Mean (logged) | 0.372 | 95% H-UCL (KM -Log) | 96.23 |
| KM SD (logged) | 2.423 | 95% Critical H Value (KM-Log) | 4.227 |
| KM Standard Error of Mean (logged) | 0.372 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 17.04 | Mean in Log Scale | 0.311 |
| SD in Original Scale | 29.19 | SD in Log Scale | 2.363 |
| 95% t UCL (Assumes normality) | 23.96 | 95% H-Stat UCL | 89.95 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (Chebyshev) UCL | 35.41 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 19 |
| Number of Detects | 18 | Number of Non-Detects | 33 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 1.6 | Minimum Non-Detect | 2.8 |
| Maximum Detect | 140 | Maximum Non-Detect | 10 |
| Variance Detects | 1015 | Percent Non-Detects | 64.71% |
| Mean Detects | 12.66 | SD Detects | 31.86 |

| | | | |
|---|---|---|---|
| Median Detects | 5.55 | CV Detects | 2.516 |
| Skewness Detects | 4.207 | Kurtosis Detects | 17.79 |
| Mean of Logged Detects | 1.706 | SD of Logged Detects | 0.975 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.314 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.494 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 7.204 | KM Standard Error of Mean | 2.758 |
| KM SD | 18.93 | 95% KM (BCA) UCL | 13.44 |
| 95% KM (t) UCL | 11.83 | 95% KM (Percentile Bootstrap) UCL | 12.45 |
| 95% KM (z) UCL | 11.74 | 95% KM Bootstrap t UCL | 25.76 |
| 90% KM Chebyshev UCL | 15.48 | 95% KM Chebyshev UCL | 19.22 |
| 97.5% KM Chebyshev UCL | 24.43 | 99% KM Chebyshev UCL | 34.64 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 3.08 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.78 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.402 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.212 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.723 | k star (bias corrected MLE) | 0.639 |
| Theta hat (MLE) | 17.52 | Theta star (bias corrected MLE) | 19.81 |
| nu hat (MLE) | 26.01 | nu star (bias corrected) | 23.01 |
| Mean (detects) | 12.66 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 9.081 |
| Maximum | 140 | Median | 3.1 |
| SD | 21.38 | CV | 2.354 |
| k hat (MLE) | 0.262 | k star (bias corrected MLE) | 0.26 |
| Theta hat (MLE) | 34.65 | Theta star (bias corrected MLE) | 34.96 |
| nu hat (MLE) | 26.73 | nu star (bias corrected) | 26.49 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (26.49, α) | 15.76 | Adjusted Chi Square Value (26.49, β) | 15.52 |
| 95% Gamma Approximate UCL (use when n>=50) | 15.27 | 95% Gamma Adjusted UCL (use when n<50) | 15.5 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 7.204 | SD (KM) | 18.93 |
| Variance (KM) | 358.4 | SE of Mean (KM) | 2.758 |
| k hat (KM) | 0.145 | k star (KM) | 0.149 |

| | | | |
|---|---|---|---|
| nu hat (KM) | 14.77 | nu star (KM) | 15.23 |
| theta hat (KM) | 49.75 | theta star (KM) | 48.23 |
| 80% gamma percentile (KM) | 7.813 | 90% gamma percentile (KM) | 21.35 |
| 95% gamma percentile (KM) | 39.68 | 99% gamma percentile (KM) | 92.93 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (15.23, α) | 7.424 | Adjusted Chi Square Value (15.23, β) | 7.265 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 14.78 | 95% Gamma Adjusted KM-UCL (use when n<50) | 15.1 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.766 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.264 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 7.668 | Mean in Log Scale | 1.434 |
| SD in Original Scale | 19.24 | SD in Log Scale | 0.885 |
| 95% t UCL (assumes normality of ROS data) | 12.18 | 95% Percentile Bootstrap UCL | 12.74 |
| 95% BCA Bootstrap UCL | 16.38 | 95% Bootstrap t UCL | 28.25 |
| 95% H-UCL (Log ROS) | 8.16 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.418 | KM Geo Mean | 4.127 |
| KM SD (logged) | 0.779 | 95% Critical H Value (KM-Log) | 2.093 |
| KM Standard Error of Mean (logged) | 0.153 | 95% H-UCL (KM -Log) | 7.044 |
| KM SD (logged) | 0.779 | 95% Critical H Value (KM-Log) | 2.093 |
| KM Standard Error of Mean (logged) | 0.153 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 7.157 | Mean in Log Scale | 1.488 |
| SD in Original Scale | 19.04 | SD in Log Scale | 0.669 |
| 95% t UCL (Assumes normality) | 11.63 | 95% H-Stat UCL | 6.69 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 19.22

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 5 |

| | | | |
|---|---|---|---|
| Number of Detects | 3 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 1490 | Minimum Non-Detect | 0.35 |
| Maximum Detect | 2180 | Maximum Non-Detect | 0.42 |
| Variance Detects | 119700 | Percent Non-Detects | 75% |
| Mean Detects | 1820 | SD Detects | 346 |
| Median Detects | 1790 | CV Detects | 0.19 |
| Skewness Detects | 0.387 | Kurtosis Detects | N/A |
| Mean of Logged Detects | 7.495 | SD of Logged Detects | 0.19 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.994 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.201 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 455.3 | KM Standard Error of Mean | 283 |
| KM SD | 800.5 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 963.5 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 920.8 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 1304 | 95% KM Chebyshev UCL | 1689 |
| 97.5% KM Chebyshev UCL | 2223 | 99% KM Chebyshev UCL | 3271 |

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 41.61 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 43.74 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 249.7 | nu star (bias corrected) | N/A |
| Mean (detects) | 1820 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 740.5 |
| Maximum | 2180 | Median | 567.7 |
| SD | 738.5 | CV | 0.997 |
| k hat (MLE) | 0.312 | k star (bias corrected MLE) | 0.29 |
| Theta hat (MLE) | 2370 | Theta star (bias corrected MLE) | 2555 |
| nu hat (MLE) | 7.498 | nu star (bias corrected) | 6.957 |
| Adjusted Level of Significance (β) | 0.029 | | |
| Approximate Chi Square Value (6.96, α) | 2.147 | Adjusted Chi Square Value (6.96, β) | 1.763 |

| | | | |
|---|---|---|---|
| 95% Gamma Approximate UCL (use when n>=50) | 2400 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 455.3 | SD (KM) | 800.5 |
| Variance (KM) | 640786 | SE of Mean (KM) | 283 |
| k hat (KM) | 0.323 | k star (KM) | 0.298 |
| nu hat (KM) | 7.763 | nu star (KM) | 7.155 |
| theta hat (KM) | 1408 | theta star (KM) | 1527 |
| 80% gamma percentile (KM) | 697.1 | 90% gamma percentile (KM) | 1344 |
| 95% gamma percentile (KM) | 2087 | 99% gamma percentile (KM) | 4019 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (7.16, α) | 2.256 | Adjusted Chi Square Value (7.16, β) | 1.86 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1444 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1751 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 1 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.178 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1024 | Mean in Log Scale | 6.816 |
| SD in Original Scale | 537.7 | SD in Log Scale | 0.493 |
| 95% t UCL (assumes normality of ROS data) | 1302 | 95% Percentile Bootstrap UCL | 1258 |
| 95% BCA Bootstrap UCL | 1305 | 95% Bootstrap t UCL | 1429 |
| 95% H-UCL (Log ROS) | 1414 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.086 | KM Geo Mean | 2.963 |
| KM SD (logged) | 3.701 | 95% Critical H Value (KM-Log) | 8.784 |
| KM Standard Error of Mean (logged) | 1.308 | 95% H-UCL (KM -Log) | 50336742 |
| KM SD (logged) | 3.701 | 95% Critical H Value (KM-Log) | 8.784 |
| KM Standard Error of Mean (logged) | 1.308 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 455.1 | Mean in Log Scale | 0.627 |
| SD in Original Scale | 836.2 | SD in Log Scale | 4.143 |
| 95% t UCL (Assumes normality) | 888.6 | 95% H-Stat UCL | 2.059E+9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 963.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 45 |
| Number of Detects | 49 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 44 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 1.7 | Minimum Non-Detect | 1.5 |
| Maximum Detect | 4000 | Maximum Non-Detect | 1.5 |
| Variance Detects | 703723 | Percent Non-Detects | 3.922% |
| Mean Detects | 481.1 | SD Detects | 838.9 |
| Median Detects | 130 | CV Detects | 1.744 |
| Skewness Detects | 2.701 | Kurtosis Detects | 7.685 |
| Mean of Logged Detects | 4.688 | SD of Logged Detects | 2.011 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.617 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.947 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.284 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.126 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 462.3 | KM Standard Error of Mean | 115.9 |
| KM SD | 819.1 | 95% KM (BCA) UCL | 664.8 |
| 95% KM (t) UCL | 656.5 | 95% KM (Percentile Bootstrap) UCL | 651.4 |
| 95% KM (z) UCL | 652.9 | 95% KM Bootstrap t UCL | 751.1 |
| 90% KM Chebyshev UCL | 810 | 95% KM Chebyshev UCL | 967.4 |
| 97.5% KM Chebyshev UCL | 1186 | 99% KM Chebyshev UCL | 1615 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.806 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.83 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.106 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.135 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.436 | k star (bias corrected MLE) | 0.423 |
| Theta hat (MLE) | 1103 | Theta star (bias corrected MLE) | 1138 |
| nu hat (MLE) | 42.73 | nu star (bias corrected) | 41.45 |
| Mean (detects) | 481.1 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 462.2 |
| Maximum | 4000 | Median | 120 |

| | | | |
|---|---|---|---|
| SD | 827.3 | CV | 1.79 |
| k hat (MLE) | 0.368 | k star (bias corrected MLE) | 0.359 |
| Theta hat (MLE) | 1256 | Theta star (bias corrected MLE) | 1286 |
| nu hat (MLE) | 37.53 | nu star (bias corrected) | 36.65 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (36.65, α) | 23.79 | Adjusted Chi Square Value (36.65, β) | 23.49 |
| 95% Gamma Approximate UCL (use when n>=50) | 712 | 95% Gamma Adjusted UCL (use when n<50) | 721.2 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 462.3 | SD (KM) | 819.1 |
| Variance (KM) | 670993 | SE of Mean (KM) | 115.9 |
| k hat (KM) | 0.318 | k star (KM) | 0.313 |
| nu hat (KM) | 32.49 | nu star (KM) | 31.91 |
| theta hat (KM) | 1451 | theta star (KM) | 1478 |
| 80% gamma percentile (KM) | 716 | 90% gamma percentile (KM) | 1356 |
| 95% gamma percentile (KM) | 2086 | 99% gamma percentile (KM) | 3974 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.91, α) | 20 | Adjusted Chi Square Value (31.91, β) | 19.72 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 737.6 | 95% Gamma Adjusted KM-UCL (use when n<50) | 747.8 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.967 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.947 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.0729 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.126 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 462.3 | Mean in Log Scale | 4.494 |
| SD in Original Scale | 827.3 | SD in Log Scale | 2.196 |
| 95% t UCL (assumes normality of ROS data) | 656.4 | 95% Percentile Bootstrap UCL | 659.8 |
| 95% BCA Bootstrap UCL | 707.3 | 95% Bootstrap t UCL | 751 |
| 95% H-UCL (Log ROS) | 3247 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 4.52 | KM Geo Mean | 91.8 |
| KM SD (logged) | 2.121 | 95% Critical H Value (KM-Log) | 3.697 |
| KM Standard Error of Mean (logged) | 0.3 | 95% H-UCL (KM -Log) | 2638 |
| KM SD (logged) | 2.121 | 95% Critical H Value (KM-Log) | 3.697 |
| KM Standard Error of Mean (logged) | 0.3 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 462.3 | Mean in Log Scale | 4.492 |
| SD in Original Scale | 827.3 | SD in Log Scale | 2.199 |
| 95% t UCL (Assumes normality) | 656.4 | 95% H-Stat UCL | 3271 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 737.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 12 |
| Number of Detects | 11 | Number of Non-Detects | 40 |
| Number of Distinct Detects | 9 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.029 | Minimum Non-Detect | 0.1 |
| Maximum Detect | 0.3 | Maximum Non-Detect | 10 |
| Variance Detects | 0.00641 | Percent Non-Detects | 78.43% |
| Mean Detects | 0.108 | SD Detects | 0.08 |
| Median Detects | 0.11 | CV Detects | 0.739 |
| Skewness Detects | 1.367 | Kurtosis Detects | 2.452 |
| Mean of Logged Detects | -2.475 | SD of Logged Detects | 0.766 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.856 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.85 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.211 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.251 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0595 | KM Standard Error of Mean | 0.00994 |
| KM SD | 0.0481 | 95% KM (BCA) UCL | 0.0784 |
| 95% KM (t) UCL | 0.0762 | 95% KM (Percentile Bootstrap) UCL | 0.0771 |
| 95% KM (z) UCL | 0.0759 | 95% KM Bootstrap t UCL | 0.0874 |
| 90% KM Chebyshev UCL | 0.0894 | 95% KM Chebyshev UCL | 0.103 |
| 97.5% KM Chebyshev UCL | 0.122 | 99% KM Chebyshev UCL | 0.158 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.414 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.738 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.187 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.258 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.134 | k star (bias corrected MLE) | 1.613 |
| Theta hat (MLE) | 0.0507 | Theta star (bias corrected MLE) | 0.0671 |
| nu hat (MLE) | 46.96 | nu star (bias corrected) | 35.48 |
| Mean (detects) | 0.108 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.0577 |
| Maximum | 0.3 | Median | 0.043 |
| SD | 0.0524 | CV | 0.908 |
| k hat (MLE) | 1.509 | k star (bias corrected MLE) | 1.434 |
| Theta hat (MLE) | 0.0382 | Theta star (bias corrected MLE) | 0.0403 |
| nu hat (MLE) | 154 | nu star (bias corrected) | 146.2 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (146.23, α) | 119.3 | Adjusted Chi Square Value (146.23, β) | 118.6 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.0708 | 95% Gamma Adjusted UCL (use when n<50) | 0.0712 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0595 | SD (KM) | 0.0481 |
| Variance (KM) | 0.00231 | SE of Mean (KM) | 0.00994 |
| k hat (KM) | 1.536 | k star (KM) | 1.458 |
| nu hat (KM) | 156.6 | nu star (KM) | 148.8 |
| theta hat (KM) | 0.0388 | theta star (KM) | 0.0408 |
| 80% gamma percentile (KM) | 0.0924 | 90% gamma percentile (KM) | 0.125 |
| 95% gamma percentile (KM) | 0.157 | 99% gamma percentile (KM) | 0.228 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (148.75, α) | 121.6 | Adjusted Chi Square Value (148.75, β) | 120.9 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.0729 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.0733 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.924 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.85 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.182 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.251 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.0607 | Mean in Log Scale | -3.018 |
| SD in Original Scale | 0.0482 | SD in Log Scale | 0.643 |
| 95% t UCL (assumes normality of ROS data) | 0.0721 | 95% Percentile Bootstrap UCL | 0.0725 |
| 95% BCA Bootstrap UCL | 0.0741 | 95% Bootstrap t UCL | 0.0765 |
| 95% H-UCL (Log ROS) | 0.072 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -3.012 | KM Geo Mean | 0.0492 |
| KM SD (logged) | 0.556 | 95% Critical H Value (KM-Log) | 1.914 |
| KM Standard Error of Mean (logged) | 0.157 | 95% H-UCL (KM -Log) | 0.0667 |
| KM SD (logged) | 0.556 | 95% Critical H Value (KM-Log) | 1.914 |
| KM Standard Error of Mean (logged) | 0.157 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.26 | Mean in Log Scale | -2.655 |
| SD in Original Scale | 0.968 | SD in Log Scale | 0.963 |

| | | | |
|---|---|---|---|
| 95% t UCL (Assumes normality) | 0.487 | 95% H-Stat UCL | 0.152 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.0762

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 23 |
| Number of Detects | 22 | Number of Non-Detects | 29 |
| Number of Distinct Detects | 19 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.063 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 120 | Maximum Non-Detect | 0.35 |
| Variance Detects | 2100 | Percent Non-Detects | 56.86% |
| Mean Detects | 49.38 | SD Detects | 45.82 |
| Median Detects | 54.5 | CV Detects | 0.928 |
| Skewness Detects | 0.182 | Kurtosis Detects | -1.566 |
| Mean of Logged Detects | 2.281 | SD of Logged Detects | 2.722 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.852 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.911 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.241 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.184 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 21.35 | KM Standard Error of Mean | 5.477 |
| KM SD | 38.21 | 95% KM (BCA) UCL | 30.38 |
| 95% KM (t) UCL | 30.53 | 95% KM (Percentile Bootstrap) UCL | 30.47 |
| 95% KM (z) UCL | 30.36 | 95% KM Bootstrap t UCL | 32.32 |
| 90% KM Chebyshev UCL | 37.78 | 95% KM Chebyshev UCL | 45.23 |
| 97.5% KM Chebyshev UCL | 55.56 | 99% KM Chebyshev UCL | 75.85 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.747 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.825 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.253 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.198 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.406 | k star (bias corrected MLE) | 0.381 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 121.7 | Theta star (bias corrected MLE) | 129.7 |
| nu hat (MLE) | 17.85 | nu star (bias corrected) | 16.75 |
| Mean (detects) | 49.38 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 22.39 |
| Maximum | 120 | Median | 1.7 |
| SD | 38.09 | CV | 1.702 |
| k hat (MLE) | 0.211 | k star (bias corrected MLE) | 0.212 |
| Theta hat (MLE) | 106 | Theta star (bias corrected MLE) | 105.7 |
| nu hat (MLE) | 21.54 | nu star (bias corrected) | 21.6 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (21.60, α) | 12.04 | Adjusted Chi Square Value (21.60, β) | 11.83 |
| 95% Gamma Approximate UCL (use when n>=50) | 40.16 | 95% Gamma Adjusted UCL (use when n<50) | 40.87 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 21.35 | SD (KM) | 38.21 |
| Variance (KM) | 1460 | SE of Mean (KM) | 5.477 |
| k hat (KM) | 0.312 | k star (KM) | 0.307 |
| nu hat (KM) | 31.85 | nu star (KM) | 31.31 |
| theta hat (KM) | 68.39 | theta star (KM) | 69.57 |
| 80% gamma percentile (KM) | 32.93 | 90% gamma percentile (KM) | 62.8 |
| 95% gamma percentile (KM) | 96.96 | 99% gamma percentile (KM) | 185.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.31, α) | 19.52 | Adjusted Chi Square Value (31.31, β) | 19.25 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 34.24 | 95% Gamma Adjusted KM-UCL (use when n<50) | 34.72 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.806 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.911 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.282 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.184 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 21.41 | Mean in Log Scale | -0.609 |
| SD in Original Scale | 38.56 | SD in Log Scale | 3.418 |
| 95% t UCL (assumes normality of ROS data) | 30.46 | 95% Percentile Bootstrap UCL | 30.63 |
| 95% BCA Bootstrap UCL | 31.69 | 95% Bootstrap t UCL | 32.64 |
| 95% H-UCL (Log ROS) | 2751 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.4 | KM Geo Mean | 0.67 |
| KM SD (logged) | 2.927 | 95% Critical H Value (KM-Log) | 4.841 |
| KM Standard Error of Mean (logged) | 0.441 | 95% H-UCL (KM -Log) | 360.4 |
| KM SD (logged) | 2.927 | 95% Critical H Value (KM-Log) | 4.841 |

| | |
|---|---|
| KM Standard Error of Mean (logged) | 0.441 |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 21.35 | Mean in Log Scale | -0.385 |
| SD in Original Scale | 38.59 | SD in Log Scale | 2.94 |
| 95% t UCL (Assumes normality) | 30.41 | 95% H-Stat UCL | 386.9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 97.5% KM (Chebyshev) UCL | 55.56 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 5 |
| Number of Detects | 3 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 416 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 859 | Maximum Non-Detect | 0.31 |
| Variance Detects | 53356 | Percent Non-Detects | 75% |
| Mean Detects | 599.7 | SD Detects | 231 |
| Median Detects | 524 | CV Detects | 0.385 |
| Skewness Detects | 1.316 | Kurtosis Detects | N/A |
| Mean of Logged Detects | 6.349 | SD of Logged Detects | 0.37 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.92 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.295 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 150.1 | KM Standard Error of Mean | 97.64 |
| KM SD | 276.2 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 325.4 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 310.7 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 443 | 95% KM Chebyshev UCL | 575.7 |
| 97.5% KM Chebyshev UCL | 759.8 | 99% KM Chebyshev UCL | 1122 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 10.79 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 55.58 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 64.73 | nu star (bias corrected) | N/A |
| Mean (detects) | 599.7 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 152.8 |
| Maximum | 859 | Median | 0.01 |
| SD | 287.1 | CV | 1.879 |
| k hat (MLE) | 0.127 | k star (bias corrected MLE) | 0.151 |
| Theta hat (MLE) | 1207 | Theta star (bias corrected MLE) | 1015 |
| nu hat (MLE) | 3.039 | nu star (bias corrected) | 3.613 |
| Adjusted Level of Significance (β) | 0.029 | | |
| Approximate Chi Square Value (3.61, α) | 0.575 | Adjusted Chi Square Value (3.61, β) | 0.423 |
| 95% Gamma Approximate UCL (use when n>=50) | 960.1 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 150.1 | SD (KM) | 276.2 |
| Variance (KM) | 76273 | SE of Mean (KM) | 97.64 |
| k hat (KM) | 0.295 | k star (KM) | 0.277 |
| nu hat (KM) | 7.086 | nu star (KM) | 6.648 |
| theta hat (KM) | 508.3 | theta star (KM) | 541.8 |
| 80% gamma percentile (KM) | 225.3 | 90% gamma percentile (KM) | 446.5 |
| 95% gamma percentile (KM) | 704 | 99% gamma percentile (KM) | 1380 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (6.65, α) | 1.979 | Adjusted Chi Square Value (6.65, β) | 1.615 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 504 | 95% Gamma Adjusted KM-UCL (use when n<50) | 617.6 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.958 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.26 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 235.7 | Mean in Log Scale | 5.03 |
| SD in Original Scale | 246.5 | SD in Log Scale | 0.958 |
| 95% t UCL (assumes normality of ROS data) | 363.4 | 95% Percentile Bootstrap UCL | 348.5 |
| 95% BCA Bootstrap UCL | 382.9 | 95% Bootstrap t UCL | 483.2 |
| 95% H-UCL (Log ROS) | 549.8 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.38 | KM Geo Mean | 1.463 |
| KM SD (logged) | 3.45 | 95% Critical H Value (KM-Log) | 8.211 |
| KM Standard Error of Mean (logged) | 1.22 | 95% H-UCL (KM -Log) | 2870726 |
| KM SD (logged) | 3.45 | 95% Critical H Value (KM-Log) | 8.211 |
| KM Standard Error of Mean (logged) | 1.22 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 150 | Mean in Log Scale | 0.00647 |
| SD in Original Scale | 288.5 | SD in Log Scale | 3.833 |
| 95% t UCL (Assumes normality) | 299.6 | 95% H-Stat UCL | 56814587 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 325.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 8 |
| Number of Detects | 7 | Number of Non-Detects | 43 |
| Number of Distinct Detects | 6 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 3.6 | Minimum Non-Detect | 0.28 |
| Maximum Detect | 14 | Maximum Non-Detect | 0.8 |
| Variance Detects | 24.1 | Percent Non-Detects | 86% |
| Mean Detects | 10.13 | SD Detects | 4.909 |
| Median Detects | 13.7 | CV Detects | 0.485 |
| Skewness Detects | -0.646 | Kurtosis Detects | -1.977 |
| Mean of Logged Detects | 2.173 | SD of Logged Detects | 0.626 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.75 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.338 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.659 | KM Standard Error of Mean | 0.583 |
| KM SD | 3.817 | 95% KM (BCA) UCL | 2.617 |
| 95% KM (t) UCL | 2.636 | 95% KM (Percentile Bootstrap) UCL | 2.602 |
| 95% KM (z) UCL | 2.618 | 95% KM Bootstrap t UCL | 2.567 |

| | | | |
|---|---|---|---|
| 90% KM Chebyshev UCL | 3.408 | 95% KM Chebyshev UCL | 4.2 |
| 97.5% KM Chebyshev UCL | 5.3 | 99% KM Chebyshev UCL | 7.46 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.931 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.711 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.354 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.313 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 3.668 | k star (bias corrected MLE) | 2.191 |
| Theta hat (MLE) | 2.762 | Theta star (bias corrected MLE) | 4.623 |
| nu hat (MLE) | 51.35 | nu star (bias corrected) | 30.68 |
| Mean (detects) | 10.13 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.697 |
| Maximum | 14 | Median | 0.01 |
| SD | 3.926 | CV | 2.314 |
| k hat (MLE) | 0.209 | k star (bias corrected MLE) | 0.21 |
| Theta hat (MLE) | 8.114 | Theta star (bias corrected MLE) | 8.084 |
| nu hat (MLE) | 20.91 | nu star (bias corrected) | 20.99 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (20.99, α) | 11.58 | Adjusted Chi Square Value (20.99, β) | 11.37 |
| 95% Gamma Approximate UCL (use when n>=50) | 3.074 | 95% Gamma Adjusted UCL (use when n<50) | 3.131 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.659 | SD (KM) | 3.817 |
| Variance (KM) | 14.57 | SE of Mean (KM) | 0.583 |
| k hat (KM) | 0.189 | k star (KM) | 0.191 |
| nu hat (KM) | 18.89 | nu star (KM) | 19.09 |
| theta hat (KM) | 8.783 | theta star (KM) | 8.691 |
| 80% gamma percentile (KM) | 2.131 | 90% gamma percentile (KM) | 5.013 |
| 95% gamma percentile (KM) | 8.65 | 99% gamma percentile (KM) | 18.74 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (19.09, α) | 10.18 | Adjusted Chi Square Value (19.09, β) | 9.986 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 3.11 | 95% Gamma Adjusted KM-UCL (use when n<50) | 3.17 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.742 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.333 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 2.285 | Mean in Log Scale | -0.118 |
| SD in Original Scale | 3.734 | SD in Log Scale | 1.402 |
| 95% t UCL (assumes normality of ROS data) | 3.17 | 95% Percentile Bootstrap UCL | 3.2 |
| 95% BCA Bootstrap UCL | 3.375 | 95% Bootstrap t UCL | 3.589 |
| 95% H-UCL (Log ROS) | 4.177 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.791 | KM Geo Mean | 0.454 |
| KM SD (logged) | 1.215 | 95% Critical H Value (KM-Log) | 2.587 |
| KM Standard Error of Mean (logged) | 0.186 | 95% H-UCL (KM -Log) | 1.487 |
| KM SD (logged) | 1.215 | 95% Critical H Value (KM-Log) | 2.587 |
| KM Standard Error of Mean (logged) | 0.186 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.715 | Mean in Log Scale | -0.673 |
| SD in Original Scale | 3.837 | SD in Log Scale | 1.246 |
| 95% t UCL (Assumes normality) | 2.625 | 95% H-Stat UCL | 1.77 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (Chebyshev) UCL | 4.2 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 4 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | thallium | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | toluene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 19 |
| Number of Detects | 16 | Number of Non-Detects | 34 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 6.5 | Minimum Non-Detect | 0.2 |

| | | | |
|---|---|---|---|
| Maximum Detect | 9800 | Maximum Non-Detect | 0.8 |
| Variance Detects | 5476164 | Percent Non-Detects | 68% |
| Mean Detects | 1237 | SD Detects | 2340 |
| Median Detects | 610 | CV Detects | 1.891 |
| Skewness Detects | 3.681 | Kurtosis Detects | 14.18 |
| Mean of Logged Detects | 5.889 | SD of Logged Detects | 2.061 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.473 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.362 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 396.1 | KM Standard Error of Mean | 205.3 |
| KM SD | 1406 | 95% KM (BCA) UCL | 812.6 |
| 95% KM (t) UCL | 740.3 | 95% KM (Percentile Bootstrap) UCL | 783.3 |
| 95% KM (z) UCL | 733.8 | 95% KM Bootstrap t UCL | 1459 |
| 90% KM Chebyshev UCL | 1012 | 95% KM Chebyshev UCL | 1291 |
| 97.5% KM Chebyshev UCL | 1678 | 99% KM Chebyshev UCL | 2439 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.755 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.795 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.182 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.227 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.513 | k star (bias corrected MLE) | 0.459 |
| Theta hat (MLE) | 2410 | Theta star (bias corrected MLE) | 2697 |
| nu hat (MLE) | 16.43 | nu star (bias corrected) | 14.68 |
| Mean (detects) | 1237 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 395.9 |
| Maximum | 9800 | Median | 0.01 |
| SD | 1420 | CV | 3.586 |
| k hat (MLE) | 0.111 | k star (bias corrected MLE) | 0.118 |
| Theta hat (MLE) | 3571 | Theta star (bias corrected MLE) | 3368 |
| nu hat (MLE) | 11.09 | nu star (bias corrected) | 11.76 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (11.76, α) | 5.066 | Adjusted Chi Square Value (11.76, β) | 4.936 |
| 95% Gamma Approximate UCL (use when n>=50) | 918.7 | 95% Gamma Adjusted UCL (use when n<50) | 943 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 396.1 | SD (KM) | 1406 |
| Variance (KM) | 1975878 | SE of Mean (KM) | 205.3 |
| k hat (KM) | 0.0794 | k star (KM) | 0.088 |
| nu hat (KM) | 7.94 | nu star (KM) | 8.797 |
| theta hat (KM) | 4989 | theta star (KM) | 4503 |
| 80% gamma percentile (KM) | 224.4 | 90% gamma percentile (KM) | 992.3 |
| 95% gamma percentile (KM) | 2308 | 99% gamma percentile (KM) | 6702 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.80, α) | 3.205 | Adjusted Chi Square Value (8.80, β) | 3.105 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1087 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1122 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.842 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.265 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 398.8 | Mean in Log Scale | 1.828 |
| SD in Original Scale | 1419 | SD in Log Scale | 3.552 |
| 95% t UCL (assumes normality of ROS data) | 735.3 | 95% Percentile Bootstrap UCL | 779.4 |
| 95% BCA Bootstrap UCL | 1027 | 95% Bootstrap t UCL | 1524 |
| 95% H-UCL (Log ROS) | 69060 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.79 | KM Geo Mean | 2.203 |
| KM SD (logged) | 3.675 | 95% Critical H Value (KM-Log) | 6.111 |
| KM Standard Error of Mean (logged) | 0.537 | 95% H-UCL (KM -Log) | 46747 |
| KM SD (logged) | 3.675 | 95% Critical H Value (KM-Log) | 6.111 |
| KM Standard Error of Mean (logged) | 0.537 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 396.2 | Mean in Log Scale | 1.017 |
| SD in Original Scale | 1420 | SD in Log Scale | 3.598 |
| 95% t UCL (Assumes normality) | 732.8 | 95% H-Stat UCL | 38999 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 1087

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 22 | Number of Distinct Observations | 13 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.9500E-5 | Mean | 2.0595E-5 |
| Maximum | 2.2400E-5 | Median | 2.0500E-5 |
| SD | 7.0473E-7 | Std. Error of Mean | 1.5025E-7 |
| Coefficient of Variation | N/A | Skewness | 0.77 |

Normal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.954 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.911 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.123 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.184 | Data appear Normal at 5% Significance Level | |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 2.0854E-5 | 95% Adjusted-CLT UCL (Chen-1995) | 2.0869E-5 |
| | | 95% Modified-t UCL (Johnson-1978) | 2.0858E-5 |

Gamma GOF Test

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.324 | Anderson-Darling Gamma GOF Test | |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.117 | Kolmogorov-Smirnov Gamma GOF Test | |
| 5% K-S Critical Value | 0.185 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 907.9 | k star (bias corrected MLE) | 784.1 |
| Theta hat (MLE) | 2.2686E-8 | Theta star (bias corrected MLE) | 2.6267E-8 |
| nu hat (MLE) | 39946 | nu star (bias corrected) | 34500 |
| MLE Mean (bias corrected) | 2.0595E-5 | MLE Sd (bias corrected) | 7.3551E-7 |
| | | Approximate Chi Square Value (0.05) | 34069 |
| Adjusted Level of Significance | 0.0386 | Adjusted Chi Square Value | 34037 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 2.0856E-5 | 95% Adjusted Gamma UCL (use when n<50) | 2.0875E-5 |

Lognormal GOF Test

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.96 | Shapiro Wilk Lognormal GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.911 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.116 | Lilliefors Lognormal GOF Test | |
| 5% Lilliefors Critical Value | 0.184 | Data appear Lognormal at 5% Significance Level | |

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -10.85 | Mean of logged Data | -10.79 |
| Maximum of Logged Data | -10.71 | SD of logged Data | 0.0339 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | N/A | 90% Chebyshev (MVUE) UCL | 2.1041E-5 |
| 95% Chebyshev (MVUE) UCL | 2.1243E-5 | 97.5% Chebyshev (MVUE) UCL | 2.1524E-5 |
| 99% Chebyshev (MVUE) UCL | 2.2075E-5 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 2.0843E-5 | 95% Jackknife UCL | 2.0854E-5 |
| 95% Standard Bootstrap UCL | 2.0834E-5 | 95% Bootstrap-t UCL | 2.0898E-5 |
| 95% Hall's Bootstrap UCL | 2.0895E-5 | 95% Percentile Bootstrap UCL | 2.0845E-5 |
| 95% BCA Bootstrap UCL | 2.0877E-5 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2.1046E-5 | 95% Chebyshev(Mean, Sd) UCL | 2.1250E-5 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2.1534E-5 | 99% Chebyshev(Mean, Sd) UCL | 2.2090E-5 |

Suggested UCL to Use

95% Student's-t UCL 2.0854E-5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 2 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 3.1 | Minimum Non-Detect | 0.26 |
| Maximum Detect | 3.6 | Maximum Non-Detect | 2.6 |
| Variance Detects | 0.125 | Percent Non-Detects | 96% |
| Mean Detects | 3.35 | SD Detects | 0.354 |
| Median Detects | 3.35 | CV Detects | 0.106 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 1.206 | SD of Logged Detects | 0.106 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.384 | KM Standard Error of Mean | 0.122 |
| KM SD | 0.608 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.587 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.583 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.748 | 95% KM Chebyshev UCL | 0.913 |
| 97.5% KM Chebyshev UCL | 1.142 | 99% KM Chebyshev UCL | 1.593 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 179.2 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0187 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 716.9 | nu star (bias corrected) | N/A |
| Mean (detects) | 3.35 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.384 | SD (KM) | 0.608 |
| Variance (KM) | 0.369 | SE of Mean (KM) | 0.122 |
| k hat (KM) | 0.399 | k star (KM) | 0.388 |
| nu hat (KM) | 39.86 | nu star (KM) | 38.8 |
| theta hat (KM) | 0.962 | theta star (KM) | 0.989 |
| 80% gamma percentile (KM) | 0.617 | 90% gamma percentile (KM) | 1.089 |
| 95% gamma percentile (KM) | 1.611 | 99% gamma percentile (KM) | 2.926 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0452 |
| Approximate Chi Square Value (38.80, α) | 25.54 | Adjusted Chi Square Value (38.80, β) | 25.22 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.583 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.59 |

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.262 | Mean in Log Scale | 0.12 |
| SD in Original Scale | 0.648 | SD in Log Scale | 0.475 |
| 95% t UCL (assumes normality of ROS data) | 1.416 | 95% Percentile Bootstrap UCL | 1.414 |
| 95% BCA Bootstrap UCL | 1.441 | 95% Bootstrap t UCL | 1.438 |
| 95% H-UCL (Log ROS) | 1.433 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.245 | KM Geo Mean | 0.288 |
| KM SD (logged) | 0.501 | 95% Critical H Value (KM-Log) | 1.891 |
| KM Standard Error of Mean (logged) | 0.1 | 95% H-UCL (KM -Log) | 0.374 |
| KM SD (logged) | 0.501 | 95% Critical H Value (KM-Log) | 1.891 |
| KM Standard Error of Mean (logged) | 0.1 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.489 | Mean in Log Scale | -1.001 |
| SD in Original Scale | 0.616 | SD in Log Scale | 0.647 |
| 95% t UCL (Assumes normality) | 0.635 | 95% H-Stat UCL | 0.545 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 0.587 | KM H-UCL | 0.374 |

95% KM (BCA) UCL N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 15 |
| Number of Detects | 13 | Number of Non-Detects | 38 |
| Number of Distinct Detects | 12 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.9 | Minimum Non-Detect | 0.49 |
| Maximum Detect | 59 | Maximum Non-Detect | 25 |
| Variance Detects | 237.6 | Percent Non-Detects | 74.51% |
| Mean Detects | 8.769 | SD Detects | 15.41 |
| Median Detects | 3.5 | CV Detects | 1.758 |
| Skewness Detects | 3.348 | Kurtosis Detects | 11.66 |
| Mean of Logged Detects | 1.452 | SD of Logged Detects | 1.13 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.493 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.391 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 4.438 | KM Standard Error of Mean | 1.347 |
| KM SD | 8.297 | 95% KM (BCA) UCL | 6.791 |
| 95% KM (t) UCL | 6.695 | 95% KM (Percentile Bootstrap) UCL | 6.898 |
| 95% KM (z) UCL | 6.653 | 95% KM Bootstrap t UCL | 8.446 |
| 90% KM Chebyshev UCL | 8.478 | 95% KM Chebyshev UCL | 10.31 |
| 97.5% KM Chebyshev UCL | 12.85 | 99% KM Chebyshev UCL | 17.84 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.912 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.767 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.235 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.245 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.822 | k star (bias corrected MLE) | 0.683 |
| Theta hat (MLE) | 10.67 | Theta star (bias corrected MLE) | 12.83 |
| nu hat (MLE) | 21.37 | nu star (bias corrected) | 17.77 |
| Mean (detects) | 8.769 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 4.777 |
| Maximum | 59 | Median | 0.988 |
| SD | 9.564 | CV | 2.002 |
| k hat (MLE) | 0.255 | k star (bias corrected MLE) | 0.253 |
| Theta hat (MLE) | 18.76 | Theta star (bias corrected MLE) | 18.91 |
| nu hat (MLE) | 25.97 | nu star (bias corrected) | 25.77 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (25.77, α) | 15.21 | Adjusted Chi Square Value (25.77, β) | 14.97 |
| 95% Gamma Approximate UCL (use when n>=50) | 8.098 | 95% Gamma Adjusted UCL (use when n<50) | 8.226 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 4.438 | SD (KM) | 8.297 |
| Variance (KM) | 68.83 | SE of Mean (KM) | 1.347 |
| k hat (KM) | 0.286 | k star (KM) | 0.282 |
| nu hat (KM) | 29.18 | nu star (KM) | 28.8 |
| theta hat (KM) | 15.51 | theta star (KM) | 15.72 |
| 80% gamma percentile (KM) | 6.698 | 90% gamma percentile (KM) | 13.18 |
| 95% gamma percentile (KM) | 20.69 | 99% gamma percentile (KM) | 40.38 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (28.80, α) | 17.55 | Adjusted Chi Square Value (28.80, β) | 17.29 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 7.281 | 95% Gamma Adjusted KM-UCL (use when n<50) | 7.389 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.931 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.149 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 4.502 | Mean in Log Scale | 0.765 |
| SD in Original Scale | 8.564 | SD in Log Scale | 1.177 |
| 95% t UCL (assumes normality of ROS data) | 6.512 | 95% Percentile Bootstrap UCL | 6.648 |
| 95% BCA Bootstrap UCL | 8.153 | 95% Bootstrap t UCL | 9.322 |
| 95% H-UCL (Log ROS) | 6.503 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.823 | KM Geo Mean | 2.276 |
| KM SD (logged) | 1.068 | 95% Critical H Value (KM-Log) | 2.377 |
| KM Standard Error of Mean (logged) | 0.257 | 95% H-UCL (KM -Log) | 5.765 |
| KM SD (logged) | 1.068 | 95% Critical H Value (KM-Log) | 2.377 |
| KM Standard Error of Mean (logged) | 0.257 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 10.02 | Mean in Log Scale | 1.899 |
| SD in Original Scale | 8.484 | SD in Log Scale | 1.106 |

| | | | |
|---|---|---|---|
| 95% t UCL (Assumes normality) | 12.02 | 95% H-Stat UCL | 17.98 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 7.281

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 19 |
| Number of Detects | 16 | Number of Non-Detects | 34 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 14 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 4800 | Maximum Non-Detect | 0.8 |
| Variance Detects | 2251925 | Percent Non-Detects | 68% |
| Mean Detects | 2589 | SD Detects | 1501 |
| Median Detects | 2650 | CV Detects | 0.58 |
| Skewness Detects | -0.627 | Kurtosis Detects | -0.295 |
| Mean of Logged Detects | 7.088 | SD of Logged Detects | 2.049 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.91 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.176 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 828.5 | KM Standard Error of Mean | 213.3 |
| KM SD | 1461 | 95% KM (BCA) UCL | 1161 |
| 95% KM (t) UCL | 1186 | 95% KM (Percentile Bootstrap) UCL | 1181 |
| 95% KM (z) UCL | 1179 | 95% KM Bootstrap t UCL | 1227 |
| 90% KM Chebyshev UCL | 1469 | 95% KM Chebyshev UCL | 1758 |
| 97.5% KM Chebyshev UCL | 2161 | 99% KM Chebyshev UCL | 2951 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.522 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.773 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.365 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.223 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.774 | k star (bias corrected MLE) | 0.67 |
| Theta hat (MLE) | 3346 | Theta star (bias corrected MLE) | 3862 |
| nu hat (MLE) | 24.76 | nu star (bias corrected) | 21.45 |
| Mean (detects) | 2589 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 985 |
| Maximum | 4800 | Median | 256.2 |
| SD | 1409 | CV | 1.431 |
| k hat (MLE) | 0.185 | k star (bias corrected MLE) | 0.187 |
| Theta hat (MLE) | 5317 | Theta star (bias corrected MLE) | 5254 |
| nu hat (MLE) | 18.53 | nu star (bias corrected) | 18.75 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (18.75, α) | 9.933 | Adjusted Chi Square Value (18.75, β) | 9.742 |
| 95% Gamma Approximate UCL (use when n>=50) | 1859 | 95% Gamma Adjusted UCL (use when n<50) | 1896 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 828.5 | SD (KM) | 1461 |
| Variance (KM) | 2133556 | SE of Mean (KM) | 213.3 |
| k hat (KM) | 0.322 | k star (KM) | 0.316 |
| nu hat (KM) | 32.17 | nu star (KM) | 31.58 |
| theta hat (KM) | 2575 | theta star (KM) | 2624 |
| 80% gamma percentile (KM) | 1286 | 90% gamma percentile (KM) | 2428 |
| 95% gamma percentile (KM) | 3728 | 99% gamma percentile (KM) | 7085 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.58, α) | 19.74 | Adjusted Chi Square Value (31.58, β) | 19.46 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1326 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1345 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.615 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.402 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 850.1 | Mean in Log Scale | 3.926 |
| SD in Original Scale | 1463 | SD in Log Scale | 2.855 |
| 95% t UCL (assumes normality of ROS data) | 1197 | 95% Percentile Bootstrap UCL | 1200 |
| 95% BCA Bootstrap UCL | 1224 | 95% Bootstrap t UCL | 1243 |
| 95% H-UCL (Log ROS) | 21717 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.174 | KM Geo Mean | 3.234 |

| | | | |
|---|---|---|---|
| KM SD (logged) | 4.21 | 95% Critical H Value (KM-Log) | 6.936 |
| KM Standard Error of Mean (logged) | 0.615 | 95% H-UCL (KM -Log) | 1477191 |
| KM SD (logged) | 4.21 | 95% Critical H Value (KM-Log) | 6.936 |
| KM Standard Error of Mean (logged) | 0.615 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 828.6 | Mean in Log Scale | 1.431 |
| SD in Original Scale | 1475 | SD in Log Scale | 4.106 |
| 95% t UCL (Assumes normality) | 1178 | 95% H-Stat UCL | 1016767 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1186

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 28 |
| Number of Detects | 30 | Number of Non-Detects | 21 |
| Number of Distinct Detects | 26 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 2.3 | Minimum Non-Detect | 2.7 |
| Maximum Detect | 2900 | Maximum Non-Detect | 10 |
| Variance Detects | 284928 | Percent Non-Detects | 41.18% |
| Mean Detects | 140.7 | SD Detects | 533.8 |
| Median Detects | 10.5 | CV Detects | 3.793 |
| Skewness Detects | 5.119 | Kurtosis Detects | 26.98 |
| Mean of Logged Detects | 2.806 | SD of Logged Detects | 1.649 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.278 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.927 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.441 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.159 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 84.46 | KM Standard Error of Mean | 58.12 |
| KM SD | 408.1 | 95% KM (BCA) UCL | 197.2 |
| 95% KM (t) UCL | 181.9 | 95% KM (Percentile Bootstrap) UCL | 196.2 |
| 95% KM (z) UCL | 180.1 | 95% KM Bootstrap t UCL | 1216 |
| 90% KM Chebyshev UCL | 258.8 | 95% KM Chebyshev UCL | 337.8 |
| 97.5% KM Chebyshev UCL | 447.4 | 99% KM Chebyshev UCL | 662.8 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 4.373 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.85 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.281 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.173 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.319 | k star (bias corrected MLE) | 0.309 |
| Theta hat (MLE) | 441.3 | Theta star (bias corrected MLE) | 455.1 |
| nu hat (MLE) | 19.13 | nu star (bias corrected) | 18.55 |
| Mean (detects) | 140.7 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 82.79 |
| Maximum | 2900 | Median | 4 |
| SD | 412.5 | CV | 4.982 |
| k hat (MLE) | 0.163 | k star (bias corrected MLE) | 0.166 |
| Theta hat (MLE) | 508.3 | Theta star (bias corrected MLE) | 497.6 |
| nu hat (MLE) | 16.61 | nu star (bias corrected) | 16.97 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (16.97, α) | 8.651 | Adjusted Chi Square Value (16.97, β) | 8.477 |
| 95% Gamma Approximate UCL (use when n>=50) | 162.4 | 95% Gamma Adjusted UCL (use when n<50) | 165.7 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 84.46 | SD (KM) | 408.1 |
| Variance (KM) | 166545 | SE of Mean (KM) | 58.12 |
| k hat (KM) | 0.0428 | k star (KM) | 0.0534 |
| nu hat (KM) | 4.369 | nu star (KM) | 5.445 |
| theta hat (KM) | 1972 | theta star (KM) | 1582 |
| 80% gamma percentile (KM) | 14.3 | 90% gamma percentile (KM) | 139.9 |
| 95% gamma percentile (KM) | 459.1 | 99% gamma percentile (KM) | 1789 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (5.44, α) | 1.363 | Adjusted Chi Square Value (5.44, β) | 1.305 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 337.4 | 95% Gamma Adjusted KM-UCL (use when n<50) | 352.3 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.864 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.927 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.158 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.159 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 84.37 | Mean in Log Scale | 1.953 |
| SD in Original Scale | 412.2 | SD in Log Scale | 1.798 |

| | | | |
|---|---|---|---|
| 95% t UCL (assumes normality of ROS data) | 181.1 | 95% Percentile Bootstrap UCL | 195.5 |
| 95% BCA Bootstrap UCL | 294 | 95% Bootstrap t UCL | 1205 |
| 95% H-UCL (Log ROS) | 81.41 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 2.183 | KM Geo Mean | 8.869 |
| KM SD (logged) | 1.478 | 95% Critical H Value (KM-Log) | 2.854 |
| KM Standard Error of Mean (logged) | 0.216 | 95% H-UCL (KM -Log) | 48.01 |
| KM SD (logged) | 1.478 | 95% Critical H Value (KM-Log) | 2.854 |
| KM Standard Error of Mean (logged) | 0.216 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 84.57 | Mean in Log Scale | 2.215 |
| SD in Original Scale | 412.1 | SD in Log Scale | 1.479 |
| 95% t UCL (Assumes normality) | 181.3 | 95% H-Stat UCL | 49.72 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 48.01

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | yorktown aquifer | site-wide | include | total teq (who 2005) nd = 0.5 | diox/fur)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 2 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.9800E-5 | Mean | 1.9900E-5 |
| Maximum | 2.0000E-5 | Median | 1.9900E-5 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
ıe data set for variable Conc (wg | yorktown aquifer | site-wide | include | total teq (who 2005) nd = 0.5 | diox/fur) was not processe

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

UCL Statistics for Data Sets with Non-Detects

User Selected Options

| | |
|---|---|
| Date/Time of Computation | ProUCL 5.112/15/2020 5:20:39 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |

Number of Bootstrap Operations 2000

Conc (wg | surficial aquifer | site-wide | include | 1,1'-biphenyl | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 18 |
| Number of Detects | 14 | Number of Non-Detects | 37 |
| Number of Distinct Detects | 13 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 1.1 | Minimum Non-Detect | 0.22 |
| Maximum Detect | 5.5 | Maximum Non-Detect | 0.44 |
| Variance Detects | 1.506 | Percent Non-Detects | 72.55% |
| Mean Detects | 3.143 | SD Detects | 1.227 |
| Median Detects | 2.95 | CV Detects | 0.39 |
| Skewness Detects | 0.633 | Kurtosis Detects | 0.439 |
| Mean of Logged Detects | 1.07 | SD of Logged Detects | 0.418 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.941 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.163 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.022 | KM Standard Error of Mean | 0.21 |
| KM SD | 1.444 | 95% KM (BCA) UCL | 1.389 |
| 95% KM (t) UCL | 1.374 | 95% KM (Percentile Bootstrap) UCL | 1.374 |
| 95% KM (z) UCL | 1.368 | 95% KM Bootstrap t UCL | 1.409 |
| 90% KM Chebyshev UCL | 1.652 | 95% KM Chebyshev UCL | 1.937 |
| 97.5% KM Chebyshev UCL | 2.333 | 99% KM Chebyshev UCL | 3.11 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.252 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.737 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.113 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.229 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 6.778 | k star (bias corrected MLE) | 5.373 |
| Theta hat (MLE) | 0.464 | Theta star (bias corrected MLE) | 0.585 |
| nu hat (MLE) | 189.8 | nu star (bias corrected) | 150.4 |
| Mean (detects) | 3.143 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.052 |
| Maximum | 5.5 | Median | 0.24 |

| | | | |
|---|---|---|---|
| SD | 1.485 | CV | 1.411 |
| k hat (MLE) | 0.333 | k star (bias corrected MLE) | 0.326 |
| Theta hat (MLE) | 3.161 | Theta star (bias corrected MLE) | 3.224 |
| nu hat (MLE) | 33.96 | nu star (bias corrected) | 33.29 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (33.29, α) | 21.1 | Adjusted Chi Square Value (33.29, β) | 20.82 |
| 95% Gamma Approximate UCL (use when n>=50) | 1.661 | 95% Gamma Adjusted UCL (use when n<50) | 1.683 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.022 | SD (KM) | 1.444 |
| Variance (KM) | 2.085 | SE of Mean (KM) | 0.21 |
| k hat (KM) | 0.501 | k star (KM) | 0.485 |
| nu hat (KM) | 51.13 | nu star (KM) | 49.45 |
| theta hat (KM) | 2.04 | theta star (KM) | 2.109 |
| 80% gamma percentile (KM) | 1.677 | 90% gamma percentile (KM) | 2.784 |
| 95% gamma percentile (KM) | 3.971 | 99% gamma percentile (KM) | 6.898 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (49.45, α) | 34.31 | Adjusted Chi Square Value (49.45, β) | 33.94 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.474 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.49 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.952 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.874 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.142 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.226 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.439 | Mean in Log Scale | 0.0341 |
| SD in Original Scale | 1.271 | SD in Log Scale | 0.818 |
| 95% t UCL (assumes normality of ROS data) | 1.737 | 95% Percentile Bootstrap UCL | 1.727 |
| 95% BCA Bootstrap UCL | 1.782 | 95% Bootstrap t UCL | 1.796 |
| 95% H-UCL (Log ROS) | 1.849 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.805 | KM Geo Mean | 0.447 |
| KM SD (logged) | 1.172 | 95% Critical H Value (KM-Log) | 2.491 |
| KM Standard Error of Mean (logged) | 0.17 | 95% H-UCL (KM -Log) | 1.343 |
| KM SD (logged) | 1.172 | 95% Critical H Value (KM-Log) | 2.491 |
| KM Standard Error of Mean (logged) | 0.17 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.997 | Mean in Log Scale | -0.944 |
| SD in Original Scale | 1.473 | SD in Log Scale | 1.281 |
| 95% t UCL (Assumes normality) | 1.343 | 95% H-Stat UCL | 1.42 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.374

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 8 |
| Number of Detects | 4 | Number of Non-Detects | 46 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.2 | Minimum Non-Detect | 0.29 |
| Maximum Detect | 17.6 | Maximum Non-Detect | 2.9 |
| Variance Detects | 67.59 | Percent Non-Detects | 92% |
| Mean Detects | 6.798 | SD Detects | 8.221 |
| Median Detects | 4.695 | CV Detects | 1.209 |
| Skewness Detects | 0.891 | Kurtosis Detects | -1.086 |
| Mean of Logged Detects | 0.726 | SD of Logged Detects | 2.138 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.877 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.275 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.375 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.762 | KM Standard Error of Mean | 0.441 |
| KM SD | 2.69 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 1.501 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 1.487 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 2.085 | 95% KM Chebyshev UCL | 2.684 |
| 97.5% KM Chebyshev UCL | 3.517 | 99% KM Chebyshev UCL | 5.151 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.352 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.68 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.283 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.41 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.529 | k star (bias corrected MLE) | 0.299 |
| Theta hat (MLE) | 12.85 | Theta star (bias corrected MLE) | 22.74 |
| nu hat (MLE) | 4.233 | nu star (bias corrected) | 2.391 |
| Mean (detects) | 6.798 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.011 |
| Maximum | 17.6 | Median | 0.01 |
| SD | 2.96 | CV | 2.927 |
| k hat (MLE) | 0.224 | k star (bias corrected MLE) | 0.224 |
| Theta hat (MLE) | 4.51 | Theta star (bias corrected MLE) | 4.513 |
| nu hat (MLE) | 22.42 | nu star (bias corrected) | 22.41 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (22.41, α) | 12.65 | Adjusted Chi Square Value (22.41, β) | 12.43 |
| 95% Gamma Approximate UCL (use when n>=50) | 1.792 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.762 | SD (KM) | 2.69 |
| Variance (KM) | 7.235 | SE of Mean (KM) | 0.441 |
| k hat (KM) | 0.0802 | k star (KM) | 0.0887 |
| nu hat (KM) | 8.017 | nu star (KM) | 8.869 |
| theta hat (KM) | 9.5 | theta star (KM) | 8.587 |
| 80% gamma percentile (KM) | 0.438 | 90% gamma percentile (KM) | 1.916 |
| 95% gamma percentile (KM) | 4.438 | 99% gamma percentile (KM) | 12.84 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.87, α) | 3.248 | Adjusted Chi Square Value (8.87, β) | 3.147 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 2.08 | 95% Gamma Adjusted KM-UCL (use when n<50) | 2.146 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.909 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.251 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.375 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.898 | Mean in Log Scale | -1.674 |
| SD in Original Scale | 2.745 | SD in Log Scale | 1.672 |
| 95% t UCL (assumes normality of ROS data) | 1.549 | 95% Percentile Bootstrap UCL | 1.611 |
| 95% BCA Bootstrap UCL | 2.041 | 95% Bootstrap t UCL | 3.785 |
| 95% H-UCL (Log ROS) | 1.618 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.329 | KM Geo Mean | 0.265 |
| KM SD (logged) | 0.856 | 95% Critical H Value (KM-Log) | 2.195 |
| KM Standard Error of Mean (logged) | 0.18 | 95% H-UCL (KM -Log) | 0.5 |
| KM SD (logged) | 0.856 | 95% Critical H Value (KM-Log) | 2.195 |
| KM Standard Error of Mean (logged) | 0.18 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.925 | Mean in Log Scale | -0.863 |
| SD in Original Scale | 2.693 | SD in Log Scale | 0.849 |

| | | | |
|---|---|---|---|
| 95% t UCL (Assumes normality) | 1.564 | 95% H-Stat UCL | 0.788 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1.501

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | 2-methylnaphthalene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 23 |
| Number of Detects | 19 | Number of Non-Detects | 32 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.065 | Minimum Non-Detect | 0.1 |
| Maximum Detect | 71 | Maximum Non-Detect | 0.76 |
| Variance Detects | 573.6 | Percent Non-Detects | 62.75% |
| Mean Detects | 31.22 | SD Detects | 23.95 |
| Median Detects | 35.4 | CV Detects | 0.767 |
| Skewness Detects | 0.0259 | Kurtosis Detects | -1.199 |
| Mean of Logged Detects | 2.342 | SD of Logged Detects | 2.39 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.915 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.155 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.197 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 11.68 | KM Standard Error of Mean | 2.981 |
| KM SD | 20.72 | 95% KM (BCA) UCL | 16.69 |
| 95% KM (t) UCL | 16.67 | 95% KM (Percentile Bootstrap) UCL | 16.69 |
| 95% KM (z) UCL | 16.58 | 95% KM Bootstrap t UCL | 17.25 |
| 90% KM Chebyshev UCL | 20.62 | 95% KM Chebyshev UCL | 24.67 |
| 97.5% KM Chebyshev UCL | 30.29 | 99% KM Chebyshev UCL | 41.33 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 1.687 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.796 | Detected Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.294 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.209 | Detected Data Not Gamma Distributed at 5% Significance Level | |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.567 | k star (bias corrected MLE) | 0.512 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 55.07 | Theta star (bias corrected MLE) | 60.92 |
| nu hat (MLE) | 21.54 | nu star (bias corrected) | 19.47 |
| Mean (detects) | 31.22 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 12.86 |
| Maximum | 71 | Median | 1.6 |
| SD | 20.41 | CV | 1.587 |
| k hat (MLE) | 0.234 | k star (bias corrected MLE) | 0.233 |
| Theta hat (MLE) | 55.05 | Theta star (bias corrected MLE) | 55.2 |
| nu hat (MLE) | 23.83 | nu star (bias corrected) | 23.76 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (23.76, α) | 13.67 | Adjusted Chi Square Value (23.76, β) | 13.44 |
| 95% Gamma Approximate UCL (use when n>=50) | 22.36 | 95% Gamma Adjusted UCL (use when n<50) | 22.73 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 11.68 | SD (KM) | 20.72 |
| Variance (KM) | 429.2 | SE of Mean (KM) | 2.981 |
| k hat (KM) | 0.318 | k star (KM) | 0.312 |
| nu hat (KM) | 32.4 | nu star (KM) | 31.83 |
| theta hat (KM) | 36.76 | theta star (KM) | 37.42 |
| 80% gamma percentile (KM) | 18.07 | 90% gamma percentile (KM) | 34.27 |
| 95% gamma percentile (KM) | 52.74 | 99% gamma percentile (KM) | 100.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.83, α) | 19.94 | Adjusted Chi Square Value (31.83, β) | 19.66 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 18.64 | 95% Gamma Adjusted KM-UCL (use when n<50) | 18.9 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.735 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.303 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 11.86 | Mean in Log Scale | -0.406 |
| SD in Original Scale | 20.82 | SD in Log Scale | 2.921 |
| 95% t UCL (assumes normality of ROS data) | 16.74 | 95% Percentile Bootstrap UCL | 16.68 |
| 95% BCA Bootstrap UCL | 17.42 | 95% Bootstrap t UCL | 17.84 |
| 95% H-UCL (Log ROS) | 348.9 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.773 | KM Geo Mean | 0.461 |
| KM SD (logged) | 2.791 | 95% Critical H Value (KM-Log) | 4.643 |
| KM Standard Error of Mean (logged) | 0.404 | 95% H-UCL (KM -Log) | 141.6 |
| KM SD (logged) | 2.791 | 95% Critical H Value (KM-Log) | 4.643 |

| | |
|---|---|
| KM Standard Error of Mean (logged) | 0.404 |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 11.71 | Mean in Log Scale | -0.694 |
| SD in Original Scale | 20.91 | SD in Log Scale | 2.838 |
| 95% t UCL (Assumes normality) | 16.61 | 95% H-Stat UCL | 185.8 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 16.67

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | aluminum | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 20 |
| Number of Detects | 18 | Number of Non-Detects | 33 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 38.6 | Minimum Non-Detect | 23 |
| Maximum Detect | 55000 | Maximum Non-Detect | 200000 |
| Variance Detects | 1.667E+8 | Percent Non-Detects | 64.71% |
| Mean Detects | 6121 | SD Detects | 12909 |
| Median Detects | 919 | CV Detects | 2.109 |
| Skewness Detects | 3.538 | Kurtosis Detects | 13.66 |
| Mean of Logged Detects | 6.864 | SD of Logged Detects | 2.225 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.504 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.319 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 5250 | KM Standard Error of Mean | 2652 |
| KM SD | 11809 | 95% KM (BCA) UCL | 9992 |
| 95% KM (t) UCL | 9694 | 95% KM (Percentile Bootstrap) UCL | 9820 |
| 95% KM (z) UCL | 9611 | 95% KM Bootstrap t UCL | 17891 |
| 90% KM Chebyshev UCL | 13205 | 95% KM Chebyshev UCL | 16808 |
| 97.5% KM Chebyshev UCL | 21810 | 99% KM Chebyshev UCL | 31634 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.77 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.829 | Detected data appear Gamma Distributed at 5% Significance Level |

| | | | |
|---|---|---|---|
| K-S Test Statistic | 0.197 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.219 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.361 | k star (bias corrected MLE) | 0.338 |
| Theta hat (MLE) | 16975 | Theta star (bias corrected MLE) | 18135 |
| nu hat (MLE) | 12.98 | nu star (bias corrected) | 12.15 |
| Mean (detects) | 6121 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 5826 |
| Maximum | 55000 | Median | 240 |
| SD | 11435 | CV | 1.963 |
| k hat (MLE) | 0.145 | k star (bias corrected MLE) | 0.15 |
| Theta hat (MLE) | 40081 | Theta star (bias corrected MLE) | 38872 |
| nu hat (MLE) | 14.83 | nu star (bias corrected) | 15.29 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (15.29, α) | 7.462 | Adjusted Chi Square Value (15.29, β) | 7.303 |
| 95% Gamma Approximate UCL (use when n>=50) | 11936 | 95% Gamma Adjusted UCL (use when n<50) | 12197 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 5250 | SD (KM) | 11809 |
| Variance (KM) | 1.395E+8 | SE of Mean (KM) | 2652 |
| k hat (KM) | 0.198 | k star (KM) | 0.199 |
| nu hat (KM) | 20.16 | nu star (KM) | 20.3 |
| theta hat (KM) | 26566 | theta star (KM) | 26373 |
| 80% gamma percentile (KM) | 6900 | 90% gamma percentile (KM) | 15877 |
| 95% gamma percentile (KM) | 27083 | 99% gamma percentile (KM) | 57957 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (20.30, α) | 11.08 | Adjusted Chi Square Value (20.30, β) | 10.88 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 9624 | 95% Gamma Adjusted KM-UCL (use when n<50) | 9800 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.935 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.167 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.202 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 6680 | Mean in Log Scale | 6.138 |
| SD in Original Scale | 18800 | SD in Log Scale | 2.73 |
| 95% t UCL (assumes normality of ROS data) | 11092 | 95% Percentile Bootstrap UCL | 11373 |
| 95% BCA Bootstrap UCL | 14004 | 95% Bootstrap t UCL | 17416 |
| 95% H-UCL (Log ROS) | 111682 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 6.331 | KM Geo Mean | 561.7 |
| KM SD (logged) | 2.389 | 95% Critical H Value (KM-Log) | 4.071 |
| KM Standard Error of Mean (logged) | 0.536 | 95% H-UCL (KM -Log) | 38590 |
| KM SD (logged) | 2.389 | 95% Critical H Value (KM-Log) | 4.071 |
| KM Standard Error of Mean (logged) | 0.536 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 60984 | Mean in Log Scale | 9.338 |
| SD in Original Scale | 47714 | SD in Log Scale | 3.095 |
| 95% t UCL (Assumes normality) | 72182 | 95% H-Stat UCL | 12650675 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 9624

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | antimony | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 4 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 3 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | antimony | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 21 |
| Number of Detects | 20 | Number of Non-Detects | 31 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 1.7 | Minimum Non-Detect | 0.94 |
| Maximum Detect | 71 | Maximum Non-Detect | 8000 |
| Variance Detects | 221.7 | Percent Non-Detects | 60.78% |
| Mean Detects | 8.52 | SD Detects | 14.89 |
| Median Detects | 5.6 | CV Detects | 1.747 |
| Skewness Detects | 4.293 | Kurtosis Detects | 18.88 |
| Mean of Logged Detects | 1.677 | SD of Logged Detects | 0.787 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.375 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.905 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.426 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.192 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 6.888 | KM Standard Error of Mean | 2.633 |
| KM SD | 13.08 | 95% KM (BCA) UCL | 12.39 |
| 95% KM (t) UCL | 11.3 | 95% KM (Percentile Bootstrap) UCL | 11.62 |
| 95% KM (z) UCL | 11.22 | 95% KM Bootstrap t UCL | 23.71 |
| 90% KM Chebyshev UCL | 14.79 | 95% KM Chebyshev UCL | 18.37 |
| 97.5% KM Chebyshev UCL | 23.33 | 99% KM Chebyshev UCL | 33.09 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.076 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.764 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.289 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.199 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.214 | k star (bias corrected MLE) | 1.065 |
| Theta hat (MLE) | 7.017 | Theta star (bias corrected MLE) | 7.997 |
| nu hat (MLE) | 48.57 | nu star (bias corrected) | 42.61 |
| Mean (detects) | 8.52 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 6.652 |
| Maximum | 71 | Median | 3.8 |
| SD | 11.46 | CV | 1.723 |
| k hat (MLE) | 0.325 | k star (bias corrected MLE) | 0.319 |
| Theta hat (MLE) | 20.48 | Theta star (bias corrected MLE) | 20.86 |
| nu hat (MLE) | 33.13 | nu star (bias corrected) | 32.52 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (32.52, α) | 20.48 | Adjusted Chi Square Value (32.52, β) | 20.2 |
| 95% Gamma Approximate UCL (use when n>=50) | 10.56 | 95% Gamma Adjusted UCL (use when n<50) | 10.71 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 6.888 | SD (KM) | 13.08 |
| Variance (KM) | 171.1 | SE of Mean (KM) | 2.633 |
| k hat (KM) | 0.277 | k star (KM) | 0.274 |
| nu hat (KM) | 28.28 | nu star (KM) | 27.95 |
| theta hat (KM) | 24.84 | theta star (KM) | 25.14 |
| 80% gamma percentile (KM) | 10.31 | 90% gamma percentile (KM) | 20.51 |

| | | | |
|---|---|---|---|
| 95% gamma percentile (KM) | 32.42 | 99% gamma percentile (KM) | 63.73 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (27.95, α) | 16.89 | Adjusted Chi Square Value (27.95, β) | 16.64 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 11.4 | 95% Gamma Adjusted KM-UCL (use when n<50) | 11.57 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.85 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.905 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.187 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.192 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 6.208 | Mean in Log Scale | 1.347 |
| SD in Original Scale | 10.07 | SD in Log Scale | 0.907 |
| 95% t UCL (assumes normality of ROS data) | 8.572 | 95% Percentile Bootstrap UCL | 8.791 |
| 95% BCA Bootstrap UCL | 10.23 | 95% Bootstrap t UCL | 12.33 |
| 95% H-UCL (Log ROS) | 7.708 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.337 | KM Geo Mean | 3.809 |
| KM SD (logged) | 0.947 | 95% Critical H Value (KM-Log) | 2.253 |
| KM Standard Error of Mean (logged) | 0.194 | 95% H-UCL (KM -Log) | 8.067 |
| KM SD (logged) | 0.947 | 95% Critical H Value (KM-Log) | 2.253 |
| KM Standard Error of Mean (logged) | 0.194 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1964 | Mean in Log Scale | 4.698 |
| SD in Original Scale | 2016 | SD in Log Scale | 3.65 |
| 95% t UCL (Assumes normality) | 2437 | 95% H-Stat UCL | 1803001 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 8.067

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 40 |
| | | Number of Missing Observations | 0 |
| Minimum | 3.3 | Mean | 47.61 |

| | | | |
|---|---|---|---|
| Maximum | 890 | Median | 21.8 |
| SD | 125.6 | Std. Error of Mean | 17.59 |
| Coefficient of Variation | 2.638 | Skewness | 6.309 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.318 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk P Value | 0 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.375 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

| | | | |
|---|---|---|---|
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 77.08 | 95% Adjusted-CLT UCL (Chen-1995) | 93.14 |
| | | 95% Modified-t UCL (Johnson-1978) | 79.67 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 3.609 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.794 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.234 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.129 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.739 | k star (bias corrected MLE) | 0.708 |
| Theta hat (MLE) | 64.46 | Theta star (bias corrected MLE) | 67.22 |
| nu hat (MLE) | 75.33 | nu star (bias corrected) | 72.24 |
| MLE Mean (bias corrected) | 47.61 | MLE Sd (bias corrected) | 56.57 |
| | | Approximate Chi Square Value (0.05) | 53.67 |
| Adjusted Level of Significance | 0.0453 | Adjusted Chi Square Value | 53.2 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 64.08 | 95% Adjusted Gamma UCL (use when n<50) | 64.64 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.944 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk P Value | 0.0276 | Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.107 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.123 | Data appear Lognormal at 5% Significance Level |

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 1.194 | Mean of logged Data | 3.051 |
| Maximum of Logged Data | 6.791 | SD of logged Data | 1.061 |

Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | 52.91 | 90% Chebyshev (MVUE) UCL | 55.89 |
| 95% Chebyshev (MVUE) UCL | 64.69 | 97.5% Chebyshev (MVUE) UCL | 76.9 |
| 99% Chebyshev (MVUE) UCL | 100.9 | | |

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 76.54 | 95% Jackknife UCL | 77.08 |
| 95% Standard Bootstrap UCL | 75.54 | 95% Bootstrap-t UCL | 155.1 |
| 95% Hall's Bootstrap UCL | 174.3 | 95% Percentile Bootstrap UCL | 79.53 |
| 95% BCA Bootstrap UCL | 99.92 | | |
| 90% Chebyshev(Mean, Sd) UCL | 100.4 | 95% Chebyshev(Mean, Sd) UCL | 124.3 |
| 97.5% Chebyshev(Mean, Sd) UCL | 157.4 | 99% Chebyshev(Mean, Sd) UCL | 222.6 |

Suggested UCL to Use

95% H-UCL 52.91

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.
H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.
It is therefore recommended to avoid the use of H-statistic based 95% UCLs.
Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 13 |
| Number of Detects | 7 | Number of Non-Detects | 43 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | 0.77 | Minimum Non-Detect | 0.19 |
| Maximum Detect | 2100 | Maximum Non-Detect | 2.1 |
| Variance Detects | 728587 | Percent Non-Detects | 86% |
| Mean Detects | 539.3 | SD Detects | 853.6 |
| Median Detects | 110 | CV Detects | 1.583 |
| Skewness Detects | 1.44 | Kurtosis Detects | 0.566 |
| Mean of Logged Detects | 3.657 | SD of Logged Detects | 3.342 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.704 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.386 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 75.72 | KM Standard Error of Mean | 53.45 |
| KM SD | 349.9 | 95% KM (BCA) UCL | 170.6 |
| 95% KM (t) UCL | 165.3 | 95% KM (Percentile Bootstrap) UCL | 168.2 |
| 95% KM (z) UCL | 163.6 | 95% KM Bootstrap t UCL | 999.3 |
| 90% KM Chebyshev UCL | 236.1 | 95% KM Chebyshev UCL | 308.7 |
| 97.5% KM Chebyshev UCL | 409.5 | 99% KM Chebyshev UCL | 607.5 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.41 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.797 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.223 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.338 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.267 | k star (bias corrected MLE) | 0.248 |
| Theta hat (MLE) | 2021 | Theta star (bias corrected MLE) | 2177 |
| nu hat (MLE) | 3.737 | nu star (bias corrected) | 3.469 |
| Mean (detects) | 539.3 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 75.52 |
| Maximum | 2100 | Median | 0.01 |
| SD | 353.5 | CV | 4.681 |
| k hat (MLE) | 0.104 | k star (bias corrected MLE) | 0.111 |
| Theta hat (MLE) | 726.3 | Theta star (bias corrected MLE) | 679.9 |
| nu hat (MLE) | 10.4 | nu star (bias corrected) | 11.11 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (11.11, α) | 4.644 | Adjusted Chi Square Value (11.11, β) | 4.52 |
| 95% Gamma Approximate UCL (use when n>=50) | 180.6 | 95% Gamma Adjusted UCL (use when n<50) | 185.5 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 75.72 | SD (KM) | 349.9 |
| Variance (KM) | 122421 | SE of Mean (KM) | 53.45 |
| k hat (KM) | 0.0468 | k star (KM) | 0.0574 |
| nu hat (KM) | 4.683 | nu star (KM) | 5.735 |
| theta hat (KM) | 1617 | theta star (KM) | 1320 |
| 80% gamma percentile (KM) | 16.04 | 90% gamma percentile (KM) | 136 |
| 95% gamma percentile (KM) | 419.9 | 99% gamma percentile (KM) | 1557 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (5.74, α) | 1.506 | Adjusted Chi Square Value (5.74, β) | 1.443 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 288.3 | 95% Gamma Adjusted KM-UCL (use when n<50) | 300.9 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.882 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.194 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 75.54 | Mean in Log Scale | -8.51 |
| SD in Original Scale | 353.5 | SD in Log Scale | 7.313 |
| 95% t UCL (assumes normality of ROS data) | 159.3 | 95% Percentile Bootstrap UCL | 160.8 |

| | | | |
|---|---|---|---|
| 95% BCA Bootstrap UCL | 216.6 | 95% Bootstrap t UCL | 1204 |
| 95% H-UCL (Log ROS) | 1.875E+13 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.805 | KM Geo Mean | 0.447 |
| KM SD (logged) | 2.173 | 95% Critical H Value (KM-Log) | 3.867 |
| KM Standard Error of Mean (logged) | 0.354 | 95% H-UCL (KM -Log) | 15.75 |
| KM SD (logged) | 2.173 | 95% Critical H Value (KM-Log) | 3.867 |
| KM Standard Error of Mean (logged) | 0.354 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 75.83 | Mean in Log Scale | -0.457 |
| SD in Original Scale | 353.4 | SD in Log Scale | 2.121 |
| 95% t UCL (Assumes normality) | 159.6 | 95% H-Stat UCL | 18.92 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM Approximate Gamma UCL | 288.3 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 8 |
| Number of Detects | 3 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.13 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 0.55 | Maximum Non-Detect | 0.39 |
| Variance Detects | 0.0516 | Percent Non-Detects | 94.12% |
| Mean Detects | 0.29 | SD Detects | 0.227 |
| Median Detects | 0.19 | CV Detects | 0.783 |
| Skewness Detects | 1.597 | Kurtosis Detects | N/A |
| Mean of Logged Detects | -1.433 | SD of Logged Detects | 0.748 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.855 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.337 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.14 | KM Standard Error of Mean | 0.0101 |
| KM SD | 0.0588 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.157 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.156 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.17 | 95% KM Chebyshev UCL | 0.184 |
| 97.5% KM Chebyshev UCL | 0.203 | 99% KM Chebyshev UCL | 0.241 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.719 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.107 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 16.31 | nu star (bias corrected) | N/A |
| Mean (detects) | 0.29 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.112 |
| Maximum | 0.55 | Median | 0.0917 |
| SD | 0.0942 | CV | 0.84 |
| k hat (MLE) | 1.456 | k star (bias corrected MLE) | 1.384 |
| Theta hat (MLE) | 0.0769 | Theta star (bias corrected MLE) | 0.081 |
| nu hat (MLE) | 148.5 | nu star (bias corrected) | 141.1 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (141.12, α) | 114.7 | Adjusted Chi Square Value (141.12, β) | 114 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.138 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.14 | SD (KM) | 0.0588 |
| Variance (KM) | 0.00346 | SE of Mean (KM) | 0.0101 |
| k hat (KM) | 5.654 | k star (KM) | 5.334 |
| nu hat (KM) | 576.7 | nu star (KM) | 544.1 |
| theta hat (KM) | 0.0247 | theta star (KM) | 0.0262 |
| 80% gamma percentile (KM) | 0.187 | 90% gamma percentile (KM) | 0.221 |
| 95% gamma percentile (KM) | 0.252 | 99% gamma percentile (KM) | 0.317 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (544.10, α) | 491 | Adjusted Chi Square Value (544.10, β) | 489.5 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.155 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.155 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.93 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.286 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.136 | Mean in Log Scale | -2.1 |
| SD in Original Scale | 0.0758 | SD in Log Scale | 0.44 |
| 95% t UCL (assumes normality of ROS data) | 0.154 | 95% Percentile Bootstrap UCL | 0.154 |
| 95% BCA Bootstrap UCL | 0.162 | 95% Bootstrap t UCL | 0.162 |
| 95% H-UCL (Log ROS) | 0.151 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.002 | KM Geo Mean | 0.135 |
| KM SD (logged) | 0.208 | 95% Critical H Value (KM-Log) | 1.719 |
| KM Standard Error of Mean (logged) | 0.0361 | 95% H-UCL (KM -Log) | 0.145 |
| KM SD (logged) | 0.208 | 95% Critical H Value (KM-Log) | 1.719 |
| KM Standard Error of Mean (logged) | 0.0361 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.116 | Mean in Log Scale | -2.27 |
| SD in Original Scale | 0.0759 | SD in Log Scale | 0.428 |
| 95% t UCL (Assumes normality) | 0.134 | 95% H-Stat UCL | 0.126 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (t) UCL | 0.157 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 7 |
| Number of Detects | 2 | Number of Non-Detects | 49 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.088 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 0.34 | Maximum Non-Detect | 0.78 |
| Variance Detects | 0.0318 | Percent Non-Detects | 96.08% |
| Mean Detects | 0.214 | SD Detects | 0.178 |
| Median Detects | 0.214 | CV Detects | 0.833 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | -1.755 | SD of Logged Detects | 0.956 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0945 | KM Standard Error of Mean | 0.00902 |
| KM SD | 0.0398 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.11 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.109 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.122 | 95% KM Chebyshev UCL | 0.134 |
| 97.5% KM Chebyshev UCL | 0.151 | 99% KM Chebyshev UCL | 0.184 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.503 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0855 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 10.01 | nu star (bias corrected) | N/A |
| Mean (detects) | 0.214 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0945 | SD (KM) | 0.0398 |
| Variance (KM) | 0.00159 | SE of Mean (KM) | 0.00902 |
| k hat (KM) | 5.624 | k star (KM) | 5.306 |
| nu hat (KM) | 573.7 | nu star (KM) | 541.2 |
| theta hat (KM) | 0.0168 | theta star (KM) | 0.0178 |
| 80% gamma percentile (KM) | 0.126 | 90% gamma percentile (KM) | 0.149 |
| 95% gamma percentile (KM) | 0.17 | 99% gamma percentile (KM) | 0.215 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0453 |
| Approximate Chi Square Value (541.25, α) | 488.3 | Adjusted Chi Square Value (541.25, β) | 486.8 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.105 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.105 |

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.103 | Mean in Log Scale | -2.408 |
| SD in Original Scale | 0.0578 | SD in Log Scale | 0.517 |
| 95% t UCL (assumes normality of ROS data) | 0.116 | 95% Percentile Bootstrap UCL | 0.116 |
| 95% BCA Bootstrap UCL | 0.12 | 95% Bootstrap t UCL | 0.12 |
| 95% H-UCL (Log ROS) | 0.118 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.396 | KM Geo Mean | 0.0911 |
| KM SD (logged) | 0.214 | 95% Critical H Value (KM-Log) | 1.72 |
| KM Standard Error of Mean (logged) | 0.0484 | 95% H-UCL (KM -Log) | 0.0982 |
| KM SD (logged) | 0.214 | 95% Critical H Value (KM-Log) | 1.72 |
| KM Standard Error of Mean (logged) | 0.0484 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.135 | Mean in Log Scale | -2.207 |
| SD in Original Scale | 0.106 | SD in Log Scale | 0.572 |
| 95% t UCL (Assumes normality) | 0.159 | 95% H-Stat UCL | 0.151 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 0.134

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 8 |
| Number of Detects | 3 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.11 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 0.32 | Maximum Non-Detect | 0.75 |
| Variance Detects | 0.0111 | Percent Non-Detects | 94.12% |
| Mean Detects | 0.21 | SD Detects | 0.105 |
| Median Detects | 0.2 | CV Detects | 0.502 |
| Skewness Detects | 0.423 | Kurtosis Detects | N/A |
| Mean of Logged Detects | -1.652 | SD of Logged Detects | 0.535 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.993 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.204 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.118 | KM Standard Error of Mean | 0.00701 |
| KM SD | 0.0358 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.129 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.129 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.139 | 95% KM Chebyshev UCL | 0.148 |
| 97.5% KM Chebyshev UCL | 0.161 | 99% KM Chebyshev UCL | 0.187 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 5.632 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0373 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 33.79 | nu star (bias corrected) | N/A |
| Mean (detects) | 0.21 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.0172 | Mean | 0.113 |
| Maximum | 0.32 | Median | 0.106 |
| SD | 0.0564 | CV | 0.5 |
| k hat (MLE) | 3.9 | k star (bias corrected MLE) | 3.683 |
| Theta hat (MLE) | 0.0289 | Theta star (bias corrected MLE) | 0.0306 |
| nu hat (MLE) | 397.8 | nu star (bias corrected) | 375.7 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (375.69, α) | 331.8 | Adjusted Chi Square Value (375.69, β) | 330.6 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.128 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.118 | SD (KM) | 0.0358 |
| Variance (KM) | 0.00128 | SE of Mean (KM) | 0.00701 |
| k hat (KM) | 10.83 | k star (KM) | 10.2 |
| nu hat (KM) | 1104 | nu star (KM) | 1041 |
| theta hat (KM) | 0.0109 | theta star (KM) | 0.0115 |
| 80% gamma percentile (KM) | 0.147 | 90% gamma percentile (KM) | 0.167 |
| 95% gamma percentile (KM) | 0.184 | 99% gamma percentile (KM) | 0.22 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (N/A, α) | 966.9 | Adjusted Chi Square Value (N/A, β) | 964.8 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.127 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.127 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.995 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.198 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.119 | Mean in Log Scale | -2.202 |
| SD in Original Scale | 0.0479 | SD in Log Scale | 0.373 |
| 95% t UCL (assumes normality of ROS data) | 0.13 | 95% Percentile Bootstrap UCL | 0.13 |
| 95% BCA Bootstrap UCL | 0.132 | 95% Bootstrap t UCL | 0.132 |
| 95% H-UCL (Log ROS) | 0.13 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.165 | KM Geo Mean | 0.115 |

| | | | |
|---|---|---|---|
| KM SD (logged) | 0.191 | 95% Critical H Value (KM-Log) | 1.716 |
| KM Standard Error of Mean (logged) | 0.0375 | 95% H-UCL (KM -Log) | 0.122 |
| KM SD (logged) | 0.191 | 95% Critical H Value (KM-Log) | 1.716 |
| KM Standard Error of Mean (logged) | 0.0375 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.148 | Mean in Log Scale | -2.135 |
| SD in Original Scale | 0.114 | SD in Log Scale | 0.63 |
| 95% t UCL (Assumes normality) | 0.175 | 95% H-Stat UCL | 0.172 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.129

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 4 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 3 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | beryllium | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | cadmium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 7 |
| Number of Detects | 5 | Number of Non-Detects | 46 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.3 | Minimum Non-Detect | 0.24 |
| Maximum Detect | 5 | Maximum Non-Detect | 2500 |
| Variance Detects | 4.127 | Percent Non-Detects | 90.2% |
| Mean Detects | 1.38 | SD Detects | 2.032 |
| Median Detects | 0.6 | CV Detects | 1.472 |
| Skewness Detects | 2.193 | Kurtosis Detects | 4.846 |
| Mean of Logged Detects | -0.333 | SD of Logged Detects | 1.154 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.628 | Shapiro Wilk GOF Test |

| | | |
|---|---|---|
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.431 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.343 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.667 | KM Standard Error of Mean | 0.34 |
| KM SD | 1.17 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 1.237 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 1.227 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 1.688 | 95% KM Chebyshev UCL | 2.15 |
| 97.5% KM Chebyshev UCL | 2.792 | 99% KM Chebyshev UCL | 4.053 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.751 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.694 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.381 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.365 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.893 | k star (bias corrected MLE) | 0.491 |
| Theta hat (MLE) | 1.545 | Theta star (bias corrected MLE) | 2.813 |
| nu hat (MLE) | 8.93 | nu star (bias corrected) | 4.905 |
| Mean (detects) | 1.38 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.606 |
| Maximum | 5.028 | Median | 0.01 |
| SD | 1.203 | CV | 1.985 |
| k hat (MLE) | 0.297 | k star (bias corrected MLE) | 0.293 |
| Theta hat (MLE) | 2.038 | Theta star (bias corrected MLE) | 2.068 |
| nu hat (MLE) | 30.34 | nu star (bias corrected) | 29.89 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (29.89, α) | 18.4 | Adjusted Chi Square Value (29.89, β) | 18.14 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.984 | 95% Gamma Adjusted UCL (use when n<50) | 0.998 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.667 | SD (KM) | 1.17 |
| Variance (KM) | 1.369 | SE of Mean (KM) | 0.34 |
| k hat (KM) | 0.325 | k star (KM) | 0.319 |
| nu hat (KM) | 33.15 | nu star (KM) | 32.53 |
| theta hat (KM) | 2.052 | theta star (KM) | 2.091 |
| 80% gamma percentile (KM) | 1.037 | 90% gamma percentile (KM) | 1.952 |
| 95% gamma percentile (KM) | 2.991 | 99% gamma percentile (KM) | 5.672 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (32.53, α) | 20.5 | Adjusted Chi Square Value (32.53, β) | 20.22 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.059 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.073 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.808 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.308 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.555 | Mean in Log Scale | -1.714 |
| SD in Original Scale | 1.045 | SD in Log Scale | 1.554 |
| 95% t UCL (assumes normality of ROS data) | 0.8 | 95% Percentile Bootstrap UCL | 0.812 |
| 95% BCA Bootstrap UCL | 0.869 | 95% Bootstrap t UCL | 0.96 |
| 95% H-UCL (Log ROS) | 1.152 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.941 | KM Geo Mean | 0.39 |
| KM SD (logged) | 0.788 | 95% Critical H Value (KM-Log) | 2.101 |
| KM Standard Error of Mean (logged) | 0.248 | 95% H-UCL (KM -Log) | 0.673 |
| KM SD (logged) | 0.788 | 95% Critical H Value (KM-Log) | 2.101 |
| KM Standard Error of Mean (logged) | 0.248 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 882.6 | Mean in Log Scale | 4.784 |
| SD in Original Scale | 574.9 | SD in Log Scale | 3.71 |
| 95% t UCL (Assumes normality) | 1017 | 95% H-Stat UCL | 2709477 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 0.673

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 7 |
| Number of Detects | 1 | Number of Non-Detects | 49 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 6 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | chloroform | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 20 |
| Number of Detects | 19 | Number of Non-Detects | 32 |
| Number of Distinct Detects | 18 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.78 | Minimum Non-Detect | 0.53 |
| Maximum Detect | 33 | Maximum Non-Detect | 5000 |
| Variance Detects | 81.19 | Percent Non-Detects | 62.75% |
| Mean Detects | 6.694 | SD Detects | 9.01 |
| Median Detects | 1.8 | CV Detects | 1.346 |
| Skewness Detects | 1.849 | Kurtosis Detects | 3 |
| Mean of Logged Detects | 1.135 | SD of Logged Detects | 1.237 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.704 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.307 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.197 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 5.222 | KM Standard Error of Mean | 1.661 |
| KM SD | 8.082 | 95% KM (BCA) UCL | 8.057 |
| 95% KM (t) UCL | 8.005 | 95% KM (Percentile Bootstrap) UCL | 8.017 |
| 95% KM (z) UCL | 7.954 | 95% KM Bootstrap t UCL | 9.935 |
| 90% KM Chebyshev UCL | 10.2 | 95% KM Chebyshev UCL | 12.46 |
| 97.5% KM Chebyshev UCL | 15.59 | 99% KM Chebyshev UCL | 21.75 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.32 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.778 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.264 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.206 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.777 | k star (bias corrected MLE) | 0.689 |
| Theta hat (MLE) | 8.615 | Theta star (bias corrected MLE) | 9.71 |
| nu hat (MLE) | 29.53 | nu star (bias corrected) | 26.2 |
| Mean (detects) | 6.694 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 5.187 |

| | | | |
|---|---|---|---|
| Maximum | 33 | Median | 1.5 |
| SD | 8.024 | CV | 1.547 |
| k hat (MLE) | 0.302 | k star (bias corrected MLE) | 0.297 |
| Theta hat (MLE) | 17.18 | Theta star (bias corrected MLE) | 17.45 |
| nu hat (MLE) | 30.8 | nu star (bias corrected) | 30.32 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (30.32, α) | 18.75 | Adjusted Chi Square Value (30.32, β) | 18.48 |
| 95% Gamma Approximate UCL (use when n>=50) | 8.391 | 95% Gamma Adjusted UCL (use when n<50) | 8.511 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 5.222 | SD (KM) | 8.082 |
| Variance (KM) | 65.32 | SE of Mean (KM) | 1.661 |
| k hat (KM) | 0.418 | k star (KM) | 0.406 |
| nu hat (KM) | 42.59 | nu star (KM) | 41.42 |
| theta hat (KM) | 12.51 | theta star (KM) | 12.86 |
| 80% gamma percentile (KM) | 8.443 | 90% gamma percentile (KM) | 14.71 |
| 95% gamma percentile (KM) | 21.59 | 99% gamma percentile (KM) | 38.85 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (41.42, α) | 27.67 | Adjusted Chi Square Value (41.42, β) | 27.34 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 7.818 | 95% Gamma Adjusted KM-UCL (use when n<50) | 7.911 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.883 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.901 | Detected Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.218 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.197 | Detected Data Not Lognormal at 5% Significance Level | |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 4.991 | Mean in Log Scale | 0.456 |
| SD in Original Scale | 8.246 | SD in Log Scale | 1.619 |
| 95% t UCL (assumes normality of ROS data) | 6.926 | 95% Percentile Bootstrap UCL | 6.861 |
| 95% BCA Bootstrap UCL | 7.471 | 95% Bootstrap t UCL | 7.629 |
| 95% H-UCL (Log ROS) | 11.71 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.721 | KM Geo Mean | 2.057 |
| KM SD (logged) | 1.283 | 95% Critical H Value (KM-Log) | 2.618 |
| KM Standard Error of Mean (logged) | 0.264 | 95% H-UCL (KM -Log) | 7.538 |
| KM SD (logged) | 1.283 | 95% Critical H Value (KM-Log) | 2.618 |
| KM Standard Error of Mean (logged) | 0.264 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1277 | Mean in Log Scale | 4.279 |
| SD in Original Scale | 1260 | SD in Log Scale | 3.788 |
| 95% t UCL (Assumes normality) | 1573 | 95% H-Stat UCL | 2486095 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 12.46

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 10 |
| Number of Detects | 8 | Number of Non-Detects | 42 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.37 | Minimum Non-Detect | 0.18 |
| Maximum Detect | 54.5 | Maximum Non-Detect | 0.8 |
| Variance Detects | 356.7 | Percent Non-Detects | 84% |
| Mean Detects | 29.26 | SD Detects | 18.89 |
| Median Detects | 22 | CV Detects | 0.645 |
| Skewness Detects | 0.0967 | Kurtosis Detects | -1.094 |
| Mean of Logged Detects | 2.858 | SD of Logged Detects | 1.619 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.9 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.275 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 4.845 | KM Standard Error of Mean | 1.933 |
| KM SD | 12.79 | 95% KM (BCA) UCL | 7.952 |
| 95% KM (t) UCL | 8.086 | 95% KM (Percentile Bootstrap) UCL | 7.992 |
| 95% KM (z) UCL | 8.025 | 95% KM Bootstrap t UCL | 8.659 |
| 90% KM Chebyshev UCL | 10.64 | 95% KM Chebyshev UCL | 13.27 |
| 97.5% KM Chebyshev UCL | 16.92 | 99% KM Chebyshev UCL | 24.08 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.84 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.734 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.319 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.301 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.102 | k star (bias corrected MLE) | 0.772 |
| Theta hat (MLE) | 26.56 | Theta star (bias corrected MLE) | 37.9 |
| nu hat (MLE) | 17.63 | nu star (bias corrected) | 12.35 |
| Mean (detects) | 29.26 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 4.976 |
| Maximum | 54.5 | Median | 0.01 |
| SD | 12.93 | CV | 2.599 |
| k hat (MLE) | 0.163 | k star (bias corrected MLE) | 0.167 |
| Theta hat (MLE) | 30.52 | Theta star (bias corrected MLE) | 29.87 |
| nu hat (MLE) | 16.3 | nu star (bias corrected) | 16.66 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (16.66, α) | 8.428 | Adjusted Chi Square Value (16.66, β) | 8.254 |
| 95% Gamma Approximate UCL (use when n>=50) | 9.835 | 95% Gamma Adjusted UCL (use when n<50) | 10.04 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 4.845 | SD (KM) | 12.79 |
| Variance (KM) | 163.5 | SE of Mean (KM) | 1.933 |
| k hat (KM) | 0.144 | k star (KM) | 0.148 |
| nu hat (KM) | 14.36 | nu star (KM) | 14.83 |
| theta hat (KM) | 33.74 | theta star (KM) | 32.66 |
| 80% gamma percentile (KM) | 5.226 | 90% gamma percentile (KM) | 14.34 |
| 95% gamma percentile (KM) | 26.72 | 99% gamma percentile (KM) | 62.73 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (14.83, α) | 7.146 | Adjusted Chi Square Value (14.83, β) | 6.987 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 10.06 | 95% Gamma Adjusted KM-UCL (use when n<50) | 10.29 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.662 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.383 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 5.006 | Mean in Log Scale | -1.879 |
| SD in Original Scale | 12.87 | SD in Log Scale | 3.049 |
| 95% t UCL (assumes normality of ROS data) | 8.058 | 95% Percentile Bootstrap UCL | 8.266 |
| 95% BCA Bootstrap UCL | 8.748 | 95% Bootstrap t UCL | 9.272 |
| 95% H-UCL (Log ROS) | 150.8 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.936 | KM Geo Mean | 0.392 |
| KM SD (logged) | 1.772 | 95% Critical H Value (KM-Log) | 3.304 |
| KM Standard Error of Mean (logged) | 0.273 | 95% H-UCL (KM -Log) | 4.352 |
| KM SD (logged) | 1.772 | 95% Critical H Value (KM-Log) | 3.304 |
| KM Standard Error of Mean (logged) | 0.273 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 4.966 | Mean in Log Scale | -0.54 |

| | | | |
|---|---|---|---|
| SD in Original Scale | 12.87 | SD in Log Scale | 1.691 |
| 95% t UCL (Assumes normality) | 8.018 | 95% H-Stat UCL | 5.259 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 8.086

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 14 |
| Number of Detects | 13 | Number of Non-Detects | 38 |
| Number of Distinct Detects | 11 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 1.3 | Minimum Non-Detect | 0.15 |
| Maximum Detect | 42 | Maximum Non-Detect | 13000 |
| Variance Detects | 123.4 | Percent Non-Detects | 74.51% |
| Mean Detects | 7.2 | SD Detects | 11.11 |
| Median Detects | 2.3 | CV Detects | 1.543 |
| Skewness Detects | 2.946 | Kurtosis Detects | 9.425 |
| Mean of Logged Detects | 1.311 | SD of Logged Detects | 1.09 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.572 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.298 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 4.157 | KM Standard Error of Mean | 1.815 |
| KM SD | 8.533 | 95% KM (BCA) UCL | 7.749 |
| 95% KM (t) UCL | 7.2 | 95% KM (Percentile Bootstrap) UCL | 7.171 |
| 95% KM (z) UCL | 7.143 | 95% KM Bootstrap t UCL | 12.71 |
| 90% KM Chebyshev UCL | 9.603 | 95% KM Chebyshev UCL | 12.07 |
| 97.5% KM Chebyshev UCL | 15.49 | 99% KM Chebyshev UCL | 22.22 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.102 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.763 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.238 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.244 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.883 | k star (bias corrected MLE) | 0.731 |
| Theta hat (MLE) | 8.15 | Theta star (bias corrected MLE) | 9.851 |
| nu hat (MLE) | 22.97 | nu star (bias corrected) | 19 |
| Mean (detects) | 7.2 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 4.053 |
| Maximum | 42 | Median | 0.388 |
| SD | 7.892 | CV | 1.947 |
| k hat (MLE) | 0.245 | k star (bias corrected MLE) | 0.243 |
| Theta hat (MLE) | 16.56 | Theta star (bias corrected MLE) | 16.65 |
| nu hat (MLE) | 24.97 | nu star (bias corrected) | 24.83 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (24.83, α) | 14.48 | Adjusted Chi Square Value (24.83, β) | 14.25 |
| 95% Gamma Approximate UCL (use when n>=50) | 6.949 | 95% Gamma Adjusted UCL (use when n<50) | 7.062 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 4.157 | SD (KM) | 8.533 |
| Variance (KM) | 72.81 | SE of Mean (KM) | 1.815 |
| k hat (KM) | 0.237 | k star (KM) | 0.236 |
| nu hat (KM) | 24.21 | nu star (KM) | 24.12 |
| theta hat (KM) | 17.51 | theta star (KM) | 17.58 |
| 80% gamma percentile (KM) | 5.914 | 90% gamma percentile (KM) | 12.52 |
| 95% gamma percentile (KM) | 20.46 | 99% gamma percentile (KM) | 41.74 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (24.12, α) | 13.94 | Adjusted Chi Square Value (24.12, β) | 13.71 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 7.193 | 95% Gamma Adjusted KM-UCL (use when n<50) | 7.312 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.855 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.225 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 3.8 | Mean in Log Scale | 0.329 |
| SD in Original Scale | 7.044 | SD in Log Scale | 1.44 |
| 95% t UCL (assumes normality of ROS data) | 5.453 | 95% Percentile Bootstrap UCL | 5.491 |
| 95% BCA Bootstrap UCL | 6.111 | 95% Bootstrap t UCL | 6.908 |
| 95% H-UCL (Log ROS) | 6.946 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.157 | KM Geo Mean | 1.17 |
| KM SD (logged) | 1.638 | 95% Critical H Value (KM-Log) | 3.055 |
| KM Standard Error of Mean (logged) | 0.38 | 95% H-UCL (KM -Log) | 9.087 |

| | | | |
|---|---|---|---|
| KM SD (logged) | 1.638 | 95% Critical H Value (KM-Log) | 3.055 |
| KM Standard Error of Mean (logged) | 0.38 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 3443 | Mean in Log Scale | 4.716 |
| SD in Original Scale | 3275 | SD in Log Scale | 4.51 |
| 95% t UCL (Assumes normality) | 4212 | 95% H-Stat UCL | 2.867E+8 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 7.193

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 12 |
| Number of Detects | 7 | Number of Non-Detects | 44 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 0.19 | Minimum Non-Detect | 0.23 |
| Maximum Detect | 3.6 | Maximum Non-Detect | 0.44 |
| Variance Detects | 1.409 | Percent Non-Detects | 86.27% |
| Mean Detects | 1.03 | SD Detects | 1.187 |
| Median Detects | 0.62 | CV Detects | 1.153 |
| Skewness Detects | 2.202 | Kurtosis Detects | 5.056 |
| Mean of Logged Detects | -0.401 | SD of Logged Detects | 0.956 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.707 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.333 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.319 | KM Standard Error of Mean | 0.0768 |
| KM SD | 0.498 | 95% KM (BCA) UCL | 0.519 |
| 95% KM (t) UCL | 0.448 | 95% KM (Percentile Bootstrap) UCL | 0.46 |
| 95% KM (z) UCL | 0.446 | 95% KM Bootstrap t UCL | 0.594 |
| 90% KM Chebyshev UCL | 0.55 | 95% KM Chebyshev UCL | 0.654 |
| 97.5% KM Chebyshev UCL | 0.799 | 99% KM Chebyshev UCL | 1.084 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.436 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.724 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.275 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.318 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.302 | k star (bias corrected MLE) | 0.839 |
| Theta hat (MLE) | 0.791 | Theta star (bias corrected MLE) | 1.227 |
| nu hat (MLE) | 18.23 | nu star (bias corrected) | 11.75 |
| Mean (detects) | 1.03 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.195 |
| Maximum | 3.6 | Median | 0.01 |
| SD | 0.547 | CV | 2.808 |
| k hat (MLE) | 0.352 | k star (bias corrected MLE) | 0.344 |
| Theta hat (MLE) | 0.555 | Theta star (bias corrected MLE) | 0.567 |
| nu hat (MLE) | 35.86 | nu star (bias corrected) | 35.08 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (35.08, α) | 22.53 | Adjusted Chi Square Value (35.08, β) | 22.24 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.304 | 95% Gamma Adjusted UCL (use when n<50) | 0.308 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.319 | SD (KM) | 0.498 |
| Variance (KM) | 0.248 | SE of Mean (KM) | 0.0768 |
| k hat (KM) | 0.412 | k star (KM) | 0.401 |
| nu hat (KM) | 42.03 | nu star (KM) | 40.89 |
| theta hat (KM) | 0.775 | theta star (KM) | 0.797 |
| 80% gamma percentile (KM) | 0.516 | 90% gamma percentile (KM) | 0.902 |
| 95% gamma percentile (KM) | 1.326 | 99% gamma percentile (KM) | 2.393 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (40.89, α) | 27.24 | Adjusted Chi Square Value (40.89, β) | 26.91 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.48 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.485 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.962 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.214 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.296 | Mean in Log Scale | -1.759 |

| | | | |
|---|---|---|---|
| SD in Original Scale | 0.52 | SD in Log Scale | 0.952 |
| 95% t UCL (assumes normality of ROS data) | 0.418 | 95% Percentile Bootstrap UCL | 0.424 |
| 95% BCA Bootstrap UCL | 0.506 | 95% Bootstrap t UCL | 0.616 |
| 95% H-UCL (Log ROS) | 0.367 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.431 | KM Geo Mean | 0.239 |
| KM SD (logged) | 0.55 | 95% Critical H Value (KM-Log) | 1.91 |
| KM Standard Error of Mean (logged) | 0.104 | 95% H-UCL (KM -Log) | 0.323 |
| KM SD (logged) | 0.55 | 95% Critical H Value (KM-Log) | 1.91 |
| KM Standard Error of Mean (logged) | 0.104 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.303 | Mean in Log Scale | -1.513 |
| SD in Original Scale | 0.506 | SD in Log Scale | 0.582 |
| 95% t UCL (Assumes normality) | 0.421 | 95% H-Stat UCL | 0.306 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM Approximate Gamma UCL | 0.48 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 16 |
| Number of Detects | 15 | Number of Non-Detects | 35 |
| Number of Distinct Detects | 13 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 2.9 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 1300 | Maximum Non-Detect | 0.8 |
| Variance Detects | 144073 | Percent Non-Detects | 70% |
| Mean Detects | 523.8 | SD Detects | 379.6 |
| Median Detects | 490 | CV Detects | 0.725 |
| Skewness Detects | 0.844 | Kurtosis Detects | 1.074 |
| Mean of Logged Detects | 5.547 | SD of Logged Detects | 1.916 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.858 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.256 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.22 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 157.3 | KM Standard Error of Mean | 45.81 |
| KM SD | 312.9 | 95% KM (BCA) UCL | 239.5 |
| 95% KM (t) UCL | 234.1 | 95% KM (Percentile Bootstrap) UCL | 239.6 |
| 95% KM (z) UCL | 232.6 | 95% KM Bootstrap t UCL | 256 |
| 90% KM Chebyshev UCL | 294.7 | 95% KM Chebyshev UCL | 356.9 |
| 97.5% KM Chebyshev UCL | 443.3 | 99% KM Chebyshev UCL | 613 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.649 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.771 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.348 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.23 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.828 | k star (bias corrected MLE) | 0.706 |
| Theta hat (MLE) | 633 | Theta star (bias corrected MLE) | 741.4 |
| nu hat (MLE) | 24.83 | nu star (bias corrected) | 21.19 |
| Mean (detects) | 523.8 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 160.2 |
| Maximum | 1300 | Median | 0.01 |
| SD | 314.9 | CV | 1.966 |
| k hat (MLE) | 0.128 | k star (bias corrected MLE) | 0.134 |
| Theta hat (MLE) | 1250 | Theta star (bias corrected MLE) | 1197 |
| nu hat (MLE) | 12.81 | nu star (bias corrected) | 13.38 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (13.38, α) | 6.148 | Adjusted Chi Square Value (13.38, β) | 6.002 |
| 95% Gamma Approximate UCL (use when n>=50) | 348.6 | 95% Gamma Adjusted UCL (use when n<50) | 357.1 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 157.3 | SD (KM) | 312.9 |
| Variance (KM) | 97913 | SE of Mean (KM) | 45.81 |
| k hat (KM) | 0.253 | k star (KM) | 0.251 |
| nu hat (KM) | 25.26 | nu star (KM) | 25.08 |
| theta hat (KM) | 622.5 | theta star (KM) | 627.1 |
| 80% gamma percentile (KM) | 228.7 | 90% gamma percentile (KM) | 472 |
| 95% gamma percentile (KM) | 760.6 | 99% gamma percentile (KM) | 1528 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (25.08, α) | 14.67 | Adjusted Chi Square Value (25.08, β) | 14.44 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 268.8 | 95% Gamma Adjusted KM-UCL (use when n<50) | 273.2 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.662 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data Not Lognormal at 5% Significance Level |

| | | | |
|---|---|---|---|
| Lilliefors Test Statistic | 0.386 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.22 | Detected Data Not Lognormal at 5% Significance Level | |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 162 | Mean in Log Scale | 2.267 |
| SD in Original Scale | 313.8 | SD in Log Scale | 2.823 |
| 95% t UCL (assumes normality of ROS data) | 236.4 | 95% Percentile Bootstrap UCL | 239.1 |
| 95% BCA Bootstrap UCL | 257.3 | 95% Bootstrap t UCL | 260.7 |
| 95% H-UCL (Log ROS) | 3624 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.538 | KM Geo Mean | 1.712 |
| KM SD (logged) | 3.433 | 95% Critical H Value (KM-Log) | 5.74 |
| KM Standard Error of Mean (logged) | 0.503 | 95% H-UCL (KM -Log) | 10344 |
| KM SD (logged) | 3.433 | 95% Critical H Value (KM-Log) | 5.74 |
| KM Standard Error of Mean (logged) | 0.503 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 157.4 | Mean in Log Scale | 0.778 |
| SD in Original Scale | 316 | SD in Log Scale | 3.354 |
| 95% t UCL (Assumes normality) | 232.3 | 95% H-Stat UCL | 8903 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 356.9

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 37 |
| Number of Detects | 41 | Number of Non-Detects | 10 |
| Number of Distinct Detects | 35 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 19.8 | Minimum Non-Detect | 25 |
| Maximum Detect | 100000 | Maximum Non-Detect | 80000 |
| Variance Detects | 3.002E+8 | Percent Non-Detects | 19.61% |
| Mean Detects | 10196 | SD Detects | 17326 |
| Median Detects | 4100 | CV Detects | 1.699 |
| Skewness Detects | 3.797 | Kurtosis Detects | 18.09 |
| Mean of Logged Detects | 7.819 | SD of Logged Detects | 2.157 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.592 | Shapiro Wilk GOF Test | |

| | | |
|---|---|---|
| 5% Shapiro Wilk Critical Value | 0.941 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.278 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.137 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 9385 | KM Standard Error of Mean | 2336 |
| KM SD | 15949 | 95% KM (BCA) UCL | 13672 |
| 95% KM (t) UCL | 13300 | 95% KM (Percentile Bootstrap) UCL | 13270 |
| 95% KM (z) UCL | 13228 | 95% KM Bootstrap t UCL | 15390 |
| 90% KM Chebyshev UCL | 16394 | 95% KM Chebyshev UCL | 19568 |
| 97.5% KM Chebyshev UCL | 23974 | 99% KM Chebyshev UCL | 32629 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.236 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.823 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.0764 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.147 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.457 | k star (bias corrected MLE) | 0.44 |
| Theta hat (MLE) | 22322 | Theta star (bias corrected MLE) | 23193 |
| nu hat (MLE) | 37.46 | nu star (bias corrected) | 36.05 |
| Mean (detects) | 10196 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 9266 |
| Maximum | 100000 | Median | 3700 |
| SD | 16040 | CV | 1.731 |
| k hat (MLE) | 0.286 | k star (bias corrected MLE) | 0.283 |
| Theta hat (MLE) | 32365 | Theta star (bias corrected MLE) | 32797 |
| nu hat (MLE) | 29.2 | nu star (bias corrected) | 28.82 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (28.82, α) | 17.57 | Adjusted Chi Square Value (28.82, β) | 17.31 |
| 95% Gamma Approximate UCL (use when n>=50) | 15201 | 95% Gamma Adjusted UCL (use when n<50) | 15426 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 9385 | SD (KM) | 15949 |
| Variance (KM) | 2.544E+8 | SE of Mean (KM) | 2336 |
| k hat (KM) | 0.346 | k star (KM) | 0.339 |
| nu hat (KM) | 35.32 | nu star (KM) | 34.58 |
| theta hat (KM) | 27102 | theta star (KM) | 27685 |
| 80% gamma percentile (KM) | 14777 | 90% gamma percentile (KM) | 27232 |
| 95% gamma percentile (KM) | 41250 | 99% gamma percentile (KM) | 77151 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (34.58, α) | 22.13 | Adjusted Chi Square Value (34.58, β) | 21.84 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 14667 | 95% Gamma Adjusted KM-UCL (use when n<50) | 14862 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.938 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.941 | Detected Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.134 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.137 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 9128 | Mean in Log Scale | 7.596 |
| SD in Original Scale | 16060 | SD in Log Scale | 2.224 |
| 95% t UCL (assumes normality of ROS data) | 12896 | 95% Percentile Bootstrap UCL | 13142 |
| 95% BCA Bootstrap UCL | 14666 | 95% Bootstrap t UCL | 15405 |
| 95% H-UCL (Log ROS) | 79031 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 7.58 | KM Geo Mean | 1958 |
| KM SD (logged) | 2.308 | 95% Critical H Value (KM-Log) | 3.956 |
| KM Standard Error of Mean (logged) | 0.355 | 95% H-UCL (KM -Log) | 102120 |
| KM SD (logged) | 2.308 | 95% Critical H Value (KM-Log) | 3.956 |
| KM Standard Error of Mean (logged) | 0.355 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 14472 | Mean in Log Scale | 8.047 |
| SD in Original Scale | 19178 | SD in Log Scale | 2.454 |
| 95% t UCL (Assumes normality) | 18972 | 95% H-Stat UCL | 269377 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM Approximate Gamma UCL | 14667 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 18 |
| Number of Detects | 16 | Number of Non-Detects | 34 |
| Number of Distinct Detects | 15 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.47 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 91 | Maximum Non-Detect | 0.8 |
| Variance Detects | 809.4 | Percent Non-Detects | 68% |
| Mean Detects | 52.5 | SD Detects | 28.45 |

| | | | |
|---|---|---|---|
| Median Detects | 54.5 | CV Detects | 0.542 |
| Skewness Detects | -0.75 | Kurtosis Detects | -0.0803 |
| Mean of Logged Detects | 3.39 | SD of Logged Detects | 1.707 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.88 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.257 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 16.99 | KM Standard Error of Mean | 4.224 |
| KM SD | 28.92 | 95% KM (BCA) UCL | 24.46 |
| 95% KM (t) UCL | 24.08 | 95% KM (Percentile Bootstrap) UCL | 23.55 |
| 95% KM (z) UCL | 23.94 | 95% KM Bootstrap t UCL | 24.76 |
| 90% KM Chebyshev UCL | 29.67 | 95% KM Chebyshev UCL | 35.41 |
| 97.5% KM Chebyshev UCL | 43.37 | 99% KM Chebyshev UCL | 59.02 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.397 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.763 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.415 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.221 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.01 | k star (bias corrected MLE) | 0.862 |
| Theta hat (MLE) | 52.01 | Theta star (bias corrected MLE) | 60.91 |
| nu hat (MLE) | 32.31 | nu star (bias corrected) | 27.58 |
| Mean (detects) | 52.5 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 21.72 |
| Maximum | 91 | Median | 8.562 |
| SD | 27.39 | CV | 1.261 |
| k hat (MLE) | 0.31 | k star (bias corrected MLE) | 0.305 |
| Theta hat (MLE) | 69.99 | Theta star (bias corrected MLE) | 71.21 |
| nu hat (MLE) | 31.03 | nu star (bias corrected) | 30.5 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (30.50, α) | 18.89 | Adjusted Chi Square Value (30.50, β) | 18.62 |
| 95% Gamma Approximate UCL (use when n>=50) | 35.07 | 95% Gamma Adjusted UCL (use when n<50) | 35.59 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 16.99 | SD (KM) | 28.92 |
| Variance (KM) | 836.2 | SE of Mean (KM) | 4.224 |
| k hat (KM) | 0.345 | k star (KM) | 0.338 |

| | | | |
|---|---|---|---|
| nu hat (KM) | 34.54 | nu star (KM) | 33.8 |
| theta hat (KM) | 49.21 | theta star (KM) | 50.28 |
| 80% gamma percentile (KM) | 26.74 | 90% gamma percentile (KM) | 49.33 |
| 95% gamma percentile (KM) | 74.77 | 99% gamma percentile (KM) | 139.9 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (33.80, α) | 21.5 | Adjusted Chi Square Value (33.80, β) | 21.21 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 26.71 | 95% Gamma Adjusted KM-UCL (use when n<50) | 27.08 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.606 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.426 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 17.84 | Mean in Log Scale | 0.767 |
| SD in Original Scale | 28.76 | SD in Log Scale | 2.412 |
| 95% t UCL (assumes normality of ROS data) | 24.66 | 95% Percentile Bootstrap UCL | 24.59 |
| 95% BCA Bootstrap UCL | 25.4 | 95% Bootstrap t UCL | 25.56 |
| 95% H-UCL (Log ROS) | 168.5 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.167 | KM Geo Mean | 1.182 |
| KM SD (logged) | 2.423 | 95% Critical H Value (KM-Log) | 4.227 |
| KM Standard Error of Mean (logged) | 0.372 | 95% H-UCL (KM -Log) | 96.23 |
| KM SD (logged) | 2.423 | 95% Critical H Value (KM-Log) | 4.227 |
| KM Standard Error of Mean (logged) | 0.372 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 17.04 | Mean in Log Scale | 0.311 |
| SD in Original Scale | 29.19 | SD in Log Scale | 2.363 |
| 95% t UCL (Assumes normality) | 23.96 | 95% H-Stat UCL | 89.95 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (Chebyshev) UCL | 35.41 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 18 |

| | | | |
|---|---|---|---|
| Number of Detects | 18 | Number of Non-Detects | 33 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 1.6 | Minimum Non-Detect | 2.8 |
| Maximum Detect | 140 | Maximum Non-Detect | 9000 |
| Variance Detects | 1015 | Percent Non-Detects | 64.71% |
| Mean Detects | 12.66 | SD Detects | 31.86 |
| Median Detects | 5.55 | CV Detects | 2.516 |
| Skewness Detects | 4.207 | Kurtosis Detects | 17.79 |
| Mean of Logged Detects | 1.706 | SD of Logged Detects | 0.975 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.314 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.494 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 10.7 | KM Standard Error of Mean | 6.211 |
| KM SD | 28.31 | 95% KM (BCA) UCL | 23.28 |
| 95% KM (t) UCL | 21.11 | 95% KM (Percentile Bootstrap) UCL | 21.79 |
| 95% KM (z) UCL | 20.92 | 95% KM Bootstrap t UCL | 98.83 |
| 90% KM Chebyshev UCL | 29.34 | 95% KM Chebyshev UCL | 37.78 |
| 97.5% KM Chebyshev UCL | 49.49 | 99% KM Chebyshev UCL | 72.51 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 3.08 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.78 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.402 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.212 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.723 | k star (bias corrected MLE) | 0.639 |
| Theta hat (MLE) | 17.52 | Theta star (bias corrected MLE) | 19.81 |
| nu hat (MLE) | 26.01 | nu star (bias corrected) | 23.01 |
| Mean (detects) | 12.66 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 11.43 |
| Maximum | 140 | Median | 4.745 |
| SD | 23.79 | CV | 2.082 |
| k hat (MLE) | 0.264 | k star (bias corrected MLE) | 0.261 |
| Theta hat (MLE) | 43.34 | Theta star (bias corrected MLE) | 43.74 |
| nu hat (MLE) | 26.9 | nu star (bias corrected) | 26.65 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (26.65, α) | 15.88 | Adjusted Chi Square Value (26.65, β) | 15.64 |

| | | | |
|---|---|---|---|
| 95% Gamma Approximate UCL (use when n>=50) | 19.18 | 95% Gamma Adjusted UCL (use when n<50) | 19.48 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 10.7 | SD (KM) | 28.31 |
| Variance (KM) | 801.6 | SE of Mean (KM) | 6.211 |
| k hat (KM) | 0.143 | k star (KM) | 0.148 |
| nu hat (KM) | 14.58 | nu star (KM) | 15.06 |
| theta hat (KM) | 74.88 | theta star (KM) | 72.52 |
| 80% gamma percentile (KM) | 11.5 | 90% gamma percentile (KM) | 31.67 |
| 95% gamma percentile (KM) | 59.1 | 99% gamma percentile (KM) | 139 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (15.06, α) | 7.301 | Adjusted Chi Square Value (15.06, β) | 7.143 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 22.08 | 95% Gamma Adjusted KM-UCL (use when n<50) | 22.56 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.766 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.897 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.264 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.202 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 8.291 | Mean in Log Scale | 1.492 |
| SD in Original Scale | 19.44 | SD in Log Scale | 0.936 |
| 95% t UCL (assumes normality of ROS data) | 12.85 | 95% Percentile Bootstrap UCL | 13.6 |
| 95% BCA Bootstrap UCL | 17.27 | 95% Bootstrap t UCL | 26.05 |
| 95% H-UCL (Log ROS) | 9.266 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.511 | KM Geo Mean | 4.529 |
| KM SD (logged) | 0.954 | 95% Critical H Value (KM-Log) | 2.259 |
| KM Standard Error of Mean (logged) | 0.21 | 95% H-UCL (KM -Log) | 9.684 |
| KM SD (logged) | 0.954 | 95% Critical H Value (KM-Log) | 2.259 |
| KM Standard Error of Mean (logged) | 0.21 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 2563 | Mean in Log Scale | 5.412 |
| SD in Original Scale | 2246 | SD in Log Scale | 3.542 |
| 95% t UCL (Assumes normality) | 3090 | 95% H-Stat UCL | 2112070 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 37.78

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 5 |
| Number of Detects | 3 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 1490 | Minimum Non-Detect | 0.35 |
| Maximum Detect | 2180 | Maximum Non-Detect | 0.42 |
| Variance Detects | 119700 | Percent Non-Detects | 75% |
| Mean Detects | 1820 | SD Detects | 346 |
| Median Detects | 1790 | CV Detects | 0.19 |
| Skewness Detects | 0.387 | Kurtosis Detects | N/A |
| Mean of Logged Detects | 7.495 | SD of Logged Detects | 0.19 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.994 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.201 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 455.3 | KM Standard Error of Mean | 283 |
| KM SD | 800.5 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 963.5 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 920.8 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 1304 | 95% KM Chebyshev UCL | 1689 |
| 97.5% KM Chebyshev UCL | 2223 | 99% KM Chebyshev UCL | 3271 |

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 41.61 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 43.74 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 249.7 | nu star (bias corrected) | N/A |
| Mean (detects) | 1820 | | |

Gamma ROS Statistics using Imputed Non-Detects
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 740.5 |
| Maximum | 2180 | Median | 567.7 |

| | | | |
|---|---|---|---|
| SD | 738.5 | CV | 0.997 |
| k hat (MLE) | 0.312 | k star (bias corrected MLE) | 0.29 |
| Theta hat (MLE) | 2370 | Theta star (bias corrected MLE) | 2555 |
| nu hat (MLE) | 7.498 | nu star (bias corrected) | 6.957 |
| Adjusted Level of Significance (β) | 0.029 | | |
| Approximate Chi Square Value (6.96, α) | 2.147 | Adjusted Chi Square Value (6.96, β) | 1.763 |
| 95% Gamma Approximate UCL (use when n>=50) | 2400 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 455.3 | SD (KM) | 800.5 |
| Variance (KM) | 640786 | SE of Mean (KM) | 283 |
| k hat (KM) | 0.323 | k star (KM) | 0.298 |
| nu hat (KM) | 7.763 | nu star (KM) | 7.155 |
| theta hat (KM) | 1408 | theta star (KM) | 1527 |
| 80% gamma percentile (KM) | 697.1 | 90% gamma percentile (KM) | 1344 |
| 95% gamma percentile (KM) | 2087 | 99% gamma percentile (KM) | 4019 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (7.16, α) | 2.256 | Adjusted Chi Square Value (7.16, β) | 1.86 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1444 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1751 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 1 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.178 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1024 | Mean in Log Scale | 6.816 |
| SD in Original Scale | 537.7 | SD in Log Scale | 0.493 |
| 95% t UCL (assumes normality of ROS data) | 1302 | 95% Percentile Bootstrap UCL | 1282 |
| 95% BCA Bootstrap UCL | 1306 | 95% Bootstrap t UCL | 1413 |
| 95% H-UCL (Log ROS) | 1414 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.086 | KM Geo Mean | 2.963 |
| KM SD (logged) | 3.701 | 95% Critical H Value (KM-Log) | 8.784 |
| KM Standard Error of Mean (logged) | 1.308 | 95% H-UCL (KM -Log) | 50336742 |
| KM SD (logged) | 3.701 | 95% Critical H Value (KM-Log) | 8.784 |
| KM Standard Error of Mean (logged) | 1.308 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 455.1 | Mean in Log Scale | 0.627 |
| SD in Original Scale | 836.2 | SD in Log Scale | 4.143 |
| 95% t UCL (Assumes normality) | 888.6 | 95% H-Stat UCL | 2.059E+9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 963.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 45 |
| Number of Detects | 49 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 44 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 1.7 | Minimum Non-Detect | 1.5 |
| Maximum Detect | 4000 | Maximum Non-Detect | 1.5 |
| Variance Detects | 703723 | Percent Non-Detects | 3.922% |
| Mean Detects | 481.1 | SD Detects | 838.9 |
| Median Detects | 130 | CV Detects | 1.744 |
| Skewness Detects | 2.701 | Kurtosis Detects | 7.685 |
| Mean of Logged Detects | 4.688 | SD of Logged Detects | 2.011 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.617 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.947 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.284 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.126 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 462.3 | KM Standard Error of Mean | 115.9 |
| KM SD | 819.1 | 95% KM (BCA) UCL | 657.6 |
| 95% KM (t) UCL | 656.5 | 95% KM (Percentile Bootstrap) UCL | 655.1 |
| 95% KM (z) UCL | 652.9 | 95% KM Bootstrap t UCL | 741.7 |
| 90% KM Chebyshev UCL | 810 | 95% KM Chebyshev UCL | 967.4 |
| 97.5% KM Chebyshev UCL | 1186 | 99% KM Chebyshev UCL | 1615 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.806 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.83 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.106 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.135 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.436 | k star (bias corrected MLE) | 0.423 |
| Theta hat (MLE) | 1103 | Theta star (bias corrected MLE) | 1138 |
| nu hat (MLE) | 42.73 | nu star (bias corrected) | 41.45 |
| Mean (detects) | 481.1 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 462.2 |
| Maximum | 4000 | Median | 120 |
| SD | 827.3 | CV | 1.79 |
| k hat (MLE) | 0.368 | k star (bias corrected MLE) | 0.359 |
| Theta hat (MLE) | 1256 | Theta star (bias corrected MLE) | 1286 |
| nu hat (MLE) | 37.53 | nu star (bias corrected) | 36.65 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (36.65, α) | 23.79 | Adjusted Chi Square Value (36.65, β) | 23.49 |
| 95% Gamma Approximate UCL (use when n>=50) | 712 | 95% Gamma Adjusted UCL (use when n<50) | 721.2 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 462.3 | SD (KM) | 819.1 |
| Variance (KM) | 670993 | SE of Mean (KM) | 115.9 |
| k hat (KM) | 0.318 | k star (KM) | 0.313 |
| nu hat (KM) | 32.49 | nu star (KM) | 31.91 |
| theta hat (KM) | 1451 | theta star (KM) | 1478 |
| 80% gamma percentile (KM) | 716 | 90% gamma percentile (KM) | 1356 |
| 95% gamma percentile (KM) | 2086 | 99% gamma percentile (KM) | 3974 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.91, α) | 20 | Adjusted Chi Square Value (31.91, β) | 19.72 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 737.6 | 95% Gamma Adjusted KM-UCL (use when n<50) | 747.8 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.967 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.947 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.0729 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.126 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 462.3 | Mean in Log Scale | 4.494 |
| SD in Original Scale | 827.3 | SD in Log Scale | 2.196 |
| 95% t UCL (assumes normality of ROS data) | 656.4 | 95% Percentile Bootstrap UCL | 651.7 |
| 95% BCA Bootstrap UCL | 726.2 | 95% Bootstrap t UCL | 734.2 |
| 95% H-UCL (Log ROS) | 3247 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 4.52 | KM Geo Mean | 91.8 |
| KM SD (logged) | 2.121 | 95% Critical H Value (KM-Log) | 3.697 |
| KM Standard Error of Mean (logged) | 0.3 | 95% H-UCL (KM -Log) | 2638 |
| KM SD (logged) | 2.121 | 95% Critical H Value (KM-Log) | 3.697 |
| KM Standard Error of Mean (logged) | 0.3 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 462.3 | Mean in Log Scale | 4.492 |
| SD in Original Scale | 827.3 | SD in Log Scale | 2.199 |

| | | | |
|---|---|---|---|
| 95% t UCL (Assumes normality) | 656.4 | 95% H-Stat UCL | 3271 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 737.6

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 11 |
| Number of Detects | 11 | Number of Non-Detects | 40 |
| Number of Distinct Detects | 9 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 0.029 | Minimum Non-Detect | 0.15 |
| Maximum Detect | 0.3 | Maximum Non-Detect | 100 |
| Variance Detects | 0.00641 | Percent Non-Detects | 78.43% |
| Mean Detects | 0.108 | SD Detects | 0.08 |
| Median Detects | 0.11 | CV Detects | 0.739 |
| Skewness Detects | 1.367 | Kurtosis Detects | 2.452 |
| Mean of Logged Detects | -2.475 | SD of Logged Detects | 0.766 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.856 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.85 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.211 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.251 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.0983 | KM Standard Error of Mean | 0.0191 |
| KM SD | 0.0678 | 95% KM (BCA) UCL | 0.131 |
| 95% KM (t) UCL | 0.13 | 95% KM (Percentile Bootstrap) UCL | 0.132 |
| 95% KM (z) UCL | 0.13 | 95% KM Bootstrap t UCL | 0.138 |
| 90% KM Chebyshev UCL | 0.156 | 95% KM Chebyshev UCL | 0.182 |
| 97.5% KM Chebyshev UCL | 0.218 | 99% KM Chebyshev UCL | 0.289 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.414 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.738 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.187 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.258 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 2.134 | k star (bias corrected MLE) | 1.613 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 0.0507 | Theta star (bias corrected MLE) | 0.0671 |
| nu hat (MLE) | 46.96 | nu star (bias corrected) | 35.48 |
| Mean (detects) | 0.108 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 0.0981 |
| Maximum | 0.3 | Median | 0.085 |
| SD | 0.067 | CV | 0.683 |
| k hat (MLE) | 2.128 | k star (bias corrected MLE) | 2.016 |
| Theta hat (MLE) | 0.0461 | Theta star (bias corrected MLE) | 0.0486 |
| nu hat (MLE) | 217.1 | nu star (bias corrected) | 205.7 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (205.66, α) | 173.5 | Adjusted Chi Square Value (205.66, β) | 172.6 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.116 | 95% Gamma Adjusted UCL (use when n<50) | 0.117 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.0983 | SD (KM) | 0.0678 |
| Variance (KM) | 0.00459 | SE of Mean (KM) | 0.0191 |
| k hat (KM) | 2.106 | k star (KM) | 1.995 |
| nu hat (KM) | 214.8 | nu star (KM) | 203.5 |
| theta hat (KM) | 0.0467 | theta star (KM) | 0.0493 |
| 80% gamma percentile (KM) | 0.147 | 90% gamma percentile (KM) | 0.191 |
| 95% gamma percentile (KM) | 0.233 | 99% gamma percentile (KM) | 0.327 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (203.52, α) | 171.5 | Adjusted Chi Square Value (203.52, β) | 170.7 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.117 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.117 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.924 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.85 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.182 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.251 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.0962 | Mean in Log Scale | -2.572 |
| SD in Original Scale | 0.0692 | SD in Log Scale | 0.692 |
| 95% t UCL (assumes normality of ROS data) | 0.112 | 95% Percentile Bootstrap UCL | 0.113 |
| 95% BCA Bootstrap UCL | 0.114 | 95% Bootstrap t UCL | 0.116 |
| 95% H-UCL (Log ROS) | 0.118 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -2.553 | KM Geo Mean | 0.0779 |
| KM SD (logged) | 0.697 | 95% Critical H Value (KM-Log) | 2.023 |
| KM Standard Error of Mean (logged) | 0.213 | 95% H-UCL (KM -Log) | 0.121 |
| KM SD (logged) | 0.697 | 95% Critical H Value (KM-Log) | 2.023 |

| | |
|---|---|
| KM Standard Error of Mean (logged) | 0.213 |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 33.37 | Mean in Log Scale | 1.769 |
| SD in Original Scale | 23.76 | SD in Log Scale | 3.08 |
| 95% t UCL (Assumes normality) | 38.94 | 95% H-Stat UCL | 6101 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (t) UCL | 0.13 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 23 |
| Number of Detects | 22 | Number of Non-Detects | 29 |
| Number of Distinct Detects | 19 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.063 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 120 | Maximum Non-Detect | 0.35 |
| Variance Detects | 2100 | Percent Non-Detects | 56.86% |
| Mean Detects | 49.38 | SD Detects | 45.82 |
| Median Detects | 54.5 | CV Detects | 0.928 |
| Skewness Detects | 0.182 | Kurtosis Detects | -1.566 |
| Mean of Logged Detects | 2.281 | SD of Logged Detects | 2.722 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.852 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.911 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.241 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.184 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 21.35 | KM Standard Error of Mean | 5.477 |
| KM SD | 38.21 | 95% KM (BCA) UCL | 31.09 |
| 95% KM (t) UCL | 30.53 | 95% KM (Percentile Bootstrap) UCL | 30.63 |
| 95% KM (z) UCL | 30.36 | 95% KM Bootstrap t UCL | 32.09 |
| 90% KM Chebyshev UCL | 37.78 | 95% KM Chebyshev UCL | 45.23 |
| 97.5% KM Chebyshev UCL | 55.56 | 99% KM Chebyshev UCL | 75.85 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 1.747 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.825 | Detected Data Not Gamma Distributed at 5% Significance Level |

| | | | |
|---|---|---|---|
| K-S Test Statistic | 0.253 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.198 | Detected Data Not Gamma Distributed at 5% Significance Level | |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.406 | k star (bias corrected MLE) | 0.381 |
| Theta hat (MLE) | 121.7 | Theta star (bias corrected MLE) | 129.7 |
| nu hat (MLE) | 17.85 | nu star (bias corrected) | 16.75 |
| Mean (detects) | 49.38 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 22.39 |
| Maximum | 120 | Median | 1.7 |
| SD | 38.09 | CV | 1.702 |
| k hat (MLE) | 0.211 | k star (bias corrected MLE) | 0.212 |
| Theta hat (MLE) | 106 | Theta star (bias corrected MLE) | 105.7 |
| nu hat (MLE) | 21.54 | nu star (bias corrected) | 21.6 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (21.60, α) | 12.04 | Adjusted Chi Square Value (21.60, β) | 11.83 |
| 95% Gamma Approximate UCL (use when n>=50) | 40.16 | 95% Gamma Adjusted UCL (use when n<50) | 40.87 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 21.35 | SD (KM) | 38.21 |
| Variance (KM) | 1460 | SE of Mean (KM) | 5.477 |
| k hat (KM) | 0.312 | k star (KM) | 0.307 |
| nu hat (KM) | 31.85 | nu star (KM) | 31.31 |
| theta hat (KM) | 68.39 | theta star (KM) | 69.57 |
| 80% gamma percentile (KM) | 32.93 | 90% gamma percentile (KM) | 62.8 |
| 95% gamma percentile (KM) | 96.96 | 99% gamma percentile (KM) | 185.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.31, α) | 19.52 | Adjusted Chi Square Value (31.31, β) | 19.25 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 34.24 | 95% Gamma Adjusted KM-UCL (use when n<50) | 34.72 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.806 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.911 | Detected Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.282 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.184 | Detected Data Not Lognormal at 5% Significance Level | |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 21.41 | Mean in Log Scale | -0.609 |
| SD in Original Scale | 38.56 | SD in Log Scale | 3.418 |
| 95% t UCL (assumes normality of ROS data) | 30.46 | 95% Percentile Bootstrap UCL | 30.84 |
| 95% BCA Bootstrap UCL | 31.16 | 95% Bootstrap t UCL | 32.15 |
| 95% H-UCL (Log ROS) | 2751 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.4 | KM Geo Mean | 0.67 |
| KM SD (logged) | 2.927 | 95% Critical H Value (KM-Log) | 4.841 |
| KM Standard Error of Mean (logged) | 0.441 | 95% H-UCL (KM -Log) | 360.4 |
| KM SD (logged) | 2.927 | 95% Critical H Value (KM-Log) | 4.841 |
| KM Standard Error of Mean (logged) | 0.441 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 21.35 | Mean in Log Scale | -0.385 |
| SD in Original Scale | 38.59 | SD in Log Scale | 2.94 |
| 95% t UCL (Assumes normality) | 30.41 | 95% H-Stat UCL | 386.9 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 97.5% KM (Chebyshev) UCL | 55.56 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 5 |
| Number of Detects | 3 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 3 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 416 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 859 | Maximum Non-Detect | 0.31 |
| Variance Detects | 53356 | Percent Non-Detects | 75% |
| Mean Detects | 599.7 | SD Detects | 231 |
| Median Detects | 524 | CV Detects | 0.385 |
| Skewness Detects | 1.316 | Kurtosis Detects | N/A |
| Mean of Logged Detects | 6.349 | SD of Logged Detects | 0.37 |

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.92 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.295 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 150.1 | KM Standard Error of Mean | 97.64 |
| KM SD | 276.2 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 325.4 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 310.7 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 443 | 95% KM Chebyshev UCL | 575.7 |
| 97.5% KM Chebyshev UCL | 759.8 | 99% KM Chebyshev UCL | 1122 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 10.79 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 55.58 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 64.73 | nu star (bias corrected) | N/A |
| Mean (detects) | 599.7 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 152.8 |
| Maximum | 859 | Median | 0.01 |
| SD | 287.1 | CV | 1.879 |
| k hat (MLE) | 0.127 | k star (bias corrected MLE) | 0.151 |
| Theta hat (MLE) | 1207 | Theta star (bias corrected MLE) | 1015 |
| nu hat (MLE) | 3.039 | nu star (bias corrected) | 3.613 |
| Adjusted Level of Significance (β) | 0.029 | | |
| Approximate Chi Square Value (3.61, α) | 0.575 | Adjusted Chi Square Value (3.61, β) | 0.423 |
| 95% Gamma Approximate UCL (use when n>=50) | 960.1 | 95% Gamma Adjusted UCL (use when n<50) | N/A |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 150.1 | SD (KM) | 276.2 |
| Variance (KM) | 76273 | SE of Mean (KM) | 97.64 |
| k hat (KM) | 0.295 | k star (KM) | 0.277 |
| nu hat (KM) | 7.086 | nu star (KM) | 6.648 |
| theta hat (KM) | 508.3 | theta star (KM) | 541.8 |
| 80% gamma percentile (KM) | 225.3 | 90% gamma percentile (KM) | 446.5 |
| 95% gamma percentile (KM) | 704 | 99% gamma percentile (KM) | 1380 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (6.65, α) | 1.979 | Adjusted Chi Square Value (6.65, β) | 1.615 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 504 | 95% Gamma Adjusted KM-UCL (use when n<50) | 617.6 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.958 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.767 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.26 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.425 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 235.7 | Mean in Log Scale | 5.03 |
| SD in Original Scale | 246.5 | SD in Log Scale | 0.958 |
| 95% t UCL (assumes normality of ROS data) | 363.4 | 95% Percentile Bootstrap UCL | 354.4 |
| 95% BCA Bootstrap UCL | 405.8 | 95% Bootstrap t UCL | 493.7 |
| 95% H-UCL (Log ROS) | 549.8 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.38 | KM Geo Mean | 1.463 |
| KM SD (logged) | 3.45 | 95% Critical H Value (KM-Log) | 8.211 |
| KM Standard Error of Mean (logged) | 1.22 | 95% H-UCL (KM -Log) | 2870726 |
| KM SD (logged) | 3.45 | 95% Critical H Value (KM-Log) | 8.211 |
| KM Standard Error of Mean (logged) | 1.22 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 150 | Mean in Log Scale | 0.00647 |
| SD in Original Scale | 288.5 | SD in Log Scale | 3.833 |
| 95% t UCL (Assumes normality) | 299.6 | 95% H-Stat UCL | 56814587 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 325.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 8 |
| Number of Detects | 7 | Number of Non-Detects | 43 |
| Number of Distinct Detects | 6 | Number of Distinct Non-Detects | 2 |
| Minimum Detect | 3.6 | Minimum Non-Detect | 0.28 |
| Maximum Detect | 14 | Maximum Non-Detect | 0.8 |
| Variance Detects | 24.1 | Percent Non-Detects | 86% |
| Mean Detects | 10.13 | SD Detects | 4.909 |
| Median Detects | 13.7 | CV Detects | 0.485 |
| Skewness Detects | -0.646 | Kurtosis Detects | -1.977 |
| Mean of Logged Detects | 2.173 | SD of Logged Detects | 0.626 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.75 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.338 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 1.659 | KM Standard Error of Mean | 0.583 |
| KM SD | 3.817 | 95% KM (BCA) UCL | 2.765 |
| 95% KM (t) UCL | 2.636 | 95% KM (Percentile Bootstrap) UCL | 2.617 |
| 95% KM (z) UCL | 2.618 | 95% KM Bootstrap t UCL | 2.554 |
| 90% KM Chebyshev UCL | 3.408 | 95% KM Chebyshev UCL | 4.2 |
| 97.5% KM Chebyshev UCL | 5.3 | 99% KM Chebyshev UCL | 7.46 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.931 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.711 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.354 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.313 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 3.668 | k star (bias corrected MLE) | 2.191 |
| Theta hat (MLE) | 2.762 | Theta star (bias corrected MLE) | 4.623 |
| nu hat (MLE) | 51.35 | nu star (bias corrected) | 30.68 |
| Mean (detects) | 10.13 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 1.697 |
| Maximum | 14 | Median | 0.01 |
| SD | 3.926 | CV | 2.314 |
| k hat (MLE) | 0.209 | k star (bias corrected MLE) | 0.21 |
| Theta hat (MLE) | 8.114 | Theta star (bias corrected MLE) | 8.084 |
| nu hat (MLE) | 20.91 | nu star (bias corrected) | 20.99 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (20.99, α) | 11.58 | Adjusted Chi Square Value (20.99, β) | 11.37 |
| 95% Gamma Approximate UCL (use when n>=50) | 3.074 | 95% Gamma Adjusted UCL (use when n<50) | 3.131 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 1.659 | SD (KM) | 3.817 |
| Variance (KM) | 14.57 | SE of Mean (KM) | 0.583 |
| k hat (KM) | 0.189 | k star (KM) | 0.191 |
| nu hat (KM) | 18.89 | nu star (KM) | 19.09 |
| theta hat (KM) | 8.783 | theta star (KM) | 8.691 |
| 80% gamma percentile (KM) | 2.131 | 90% gamma percentile (KM) | 5.013 |
| 95% gamma percentile (KM) | 8.65 | 99% gamma percentile (KM) | 18.74 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (19.09, α) | 10.18 | Adjusted Chi Square Value (19.09, β) | 9.986 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 3.11 | 95% Gamma Adjusted KM-UCL (use when n<50) | 3.17 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.742 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.333 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Lognormal at 5% Significance Level | |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 2.285 | Mean in Log Scale | -0.118 |
| SD in Original Scale | 3.734 | SD in Log Scale | 1.402 |
| 95% t UCL (assumes normality of ROS data) | 3.17 | 95% Percentile Bootstrap UCL | 3.225 |
| 95% BCA Bootstrap UCL | 3.437 | 95% Bootstrap t UCL | 3.481 |
| 95% H-UCL (Log ROS) | 4.177 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -0.791 | KM Geo Mean | 0.454 |
| KM SD (logged) | 1.215 | 95% Critical H Value (KM-Log) | 2.587 |
| KM Standard Error of Mean (logged) | 0.186 | 95% H-UCL (KM -Log) | 1.487 |
| KM SD (logged) | 1.215 | 95% Critical H Value (KM-Log) | 2.587 |
| KM Standard Error of Mean (logged) | 0.186 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.715 | Mean in Log Scale | -0.673 |
| SD in Original Scale | 3.837 | SD in Log Scale | 1.246 |
| 95% t UCL (Assumes normality) | 2.625 | 95% H-Stat UCL | 1.77 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | |
|---|---|
| 95% KM (Chebyshev) UCL | 4.2 |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 4 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 3 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | thallium | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | toluene | voc)

## General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 19 |
| Number of Detects | 16 | Number of Non-Detects | 34 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 6.5 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 9800 | Maximum Non-Detect | 0.8 |
| Variance Detects | 5476164 | Percent Non-Detects | 68% |
| Mean Detects | 1237 | SD Detects | 2340 |
| Median Detects | 610 | CV Detects | 1.891 |
| Skewness Detects | 3.681 | Kurtosis Detects | 14.18 |
| Mean of Logged Detects | 5.889 | SD of Logged Detects | 2.061 |

## Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.473 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.362 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

## Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 396.1 | KM Standard Error of Mean | 205.3 |
| KM SD | 1406 | 95% KM (BCA) UCL | 819.5 |
| 95% KM (t) UCL | 740.3 | 95% KM (Percentile Bootstrap) UCL | 764.2 |
| 95% KM (z) UCL | 733.8 | 95% KM Bootstrap t UCL | 1445 |
| 90% KM Chebyshev UCL | 1012 | 95% KM Chebyshev UCL | 1291 |
| 97.5% KM Chebyshev UCL | 1678 | 99% KM Chebyshev UCL | 2439 |

## Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.755 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.795 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.182 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.227 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

## Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.513 | k star (bias corrected MLE) | 0.459 |
| Theta hat (MLE) | 2410 | Theta star (bias corrected MLE) | 2697 |
| nu hat (MLE) | 16.43 | nu star (bias corrected) | 14.68 |
| Mean (detects) | 1237 | | |

## Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 395.9 |
| Maximum | 9800 | Median | 0.01 |
| SD | 1420 | CV | 3.586 |
| k hat (MLE) | 0.111 | k star (bias corrected MLE) | 0.118 |
| Theta hat (MLE) | 3571 | Theta star (bias corrected MLE) | 3368 |

| | | | |
|---|---|---|---|
| nu hat (MLE) | 11.09 | nu star (bias corrected) | 11.76 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (11.76, α) | 5.066 | Adjusted Chi Square Value (11.76, β) | 4.936 |
| 95% Gamma Approximate UCL (use when n>=50) | 918.7 | 95% Gamma Adjusted UCL (use when n<50) | 943 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 396.1 | SD (KM) | 1406 |
| Variance (KM) | 1975878 | SE of Mean (KM) | 205.3 |
| k hat (KM) | 0.0794 | k star (KM) | 0.088 |
| nu hat (KM) | 7.94 | nu star (KM) | 8.797 |
| theta hat (KM) | 4989 | theta star (KM) | 4503 |
| 80% gamma percentile (KM) | 224.4 | 90% gamma percentile (KM) | 992.3 |
| 95% gamma percentile (KM) | 2308 | 99% gamma percentile (KM) | 6702 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (8.80, α) | 3.205 | Adjusted Chi Square Value (8.80, β) | 3.105 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1087 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1122 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.842 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.265 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Lognormal at 5% Significance Level | |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 398.8 | Mean in Log Scale | 1.828 |
| SD in Original Scale | 1419 | SD in Log Scale | 3.552 |
| 95% t UCL (assumes normality of ROS data) | 735.3 | 95% Percentile Bootstrap UCL | 771 |
| 95% BCA Bootstrap UCL | 1153 | 95% Bootstrap t UCL | 1465 |
| 95% H-UCL (Log ROS) | 69060 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.79 | KM Geo Mean | 2.203 |
| KM SD (logged) | 3.675 | 95% Critical H Value (KM-Log) | 6.111 |
| KM Standard Error of Mean (logged) | 0.537 | 95% H-UCL (KM -Log) | 46747 |
| KM SD (logged) | 3.675 | 95% Critical H Value (KM-Log) | 6.111 |
| KM Standard Error of Mean (logged) | 0.537 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 396.2 | Mean in Log Scale | 1.017 |
| SD in Original Scale | 1420 | SD in Log Scale | 3.598 |
| 95% t UCL (Assumes normality) | 732.8 | 95% H-Stat UCL | 38999 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 1087

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 22 | Number of Distinct Observations | 13 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.9500E-5 | Mean | 2.0595E-5 |
| Maximum | 2.2400E-5 | Median | 2.0500E-5 |
| SD | 7.0473E-7 | Std. Error of Mean | 1.5025E-7 |
| Coefficient of Variation | N/A | Skewness | 0.77 |

Normal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.954 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.911 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.123 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.184 | Data appear Normal at 5% Significance Level |

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

| | |
|---|---|
| 95% Normal UCL | 95% UCLs (Adjusted for Skewness) |
| 95% Student's-t UCL 2.0854E-5 | 95% Adjusted-CLT UCL (Chen-1995) 2.0869E-5 |
| | 95% Modified-t UCL (Johnson-1978) 2.0858E-5 |

Gamma GOF Test

| | | |
|---|---|---|
| A-D Test Statistic | 0.324 | Anderson-Darling Gamma GOF Test |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.117 | Kolmogorov-Smirnov Gamma GOF Test |
| 5% K-S Critical Value | 0.185 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

| | | | |
|---|---|---|---|
| k hat (MLE) | 907.9 | k star (bias corrected MLE) | 784.1 |
| Theta hat (MLE) | 2.2686E-8 | Theta star (bias corrected MLE) | 2.6267E-8 |
| nu hat (MLE) | 39946 | nu star (bias corrected) | 34500 |
| MLE Mean (bias corrected) | 2.0595E-5 | MLE Sd (bias corrected) | 7.3551E-7 |
| | | Approximate Chi Square Value (0.05) | 34069 |
| Adjusted Level of Significance | 0.0386 | Adjusted Chi Square Value | 34037 |

Assuming Gamma Distribution

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 2.0856E-5 | 95% Adjusted Gamma UCL (use when n<50) | 2.0875E-5 |

Lognormal GOF Test

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.96 | Shapiro Wilk Lognormal GOF Test |
| 5% Shapiro Wilk Critical Value | 0.911 | Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.116 | Lilliefors Lognormal GOF Test |
| 5% Lilliefors Critical Value | 0.184 | Data appear Lognormal at 5% Significance Level |

Data appear Lognormal at 5% Significance Level

### Lognormal Statistics

| | | | |
|---|---|---|---|
| Minimum of Logged Data | -10.85 | Mean of logged Data | -10.79 |
| Maximum of Logged Data | -10.71 | SD of logged Data | 0.0339 |

### Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| 95% H-UCL | N/A | 90% Chebyshev (MVUE) UCL | 2.1041E-5 |
| 95% Chebyshev (MVUE) UCL | 2.1243E-5 | 97.5% Chebyshev (MVUE) UCL | 2.1524E-5 |
| 99% Chebyshev (MVUE) UCL | 2.2075E-5 | | |

### Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

### Nonparametric Distribution Free UCLs

| | | | |
|---|---|---|---|
| 95% CLT UCL | 2.0843E-5 | 95% Jackknife UCL | 2.0854E-5 |
| 95% Standard Bootstrap UCL | 2.0833E-5 | 95% Bootstrap-t UCL | 2.0886E-5 |
| 95% Hall's Bootstrap UCL | 2.0876E-5 | 95% Percentile Bootstrap UCL | 2.0841E-5 |
| 95% BCA Bootstrap UCL | 2.0864E-5 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2.1046E-5 | 95% Chebyshev(Mean, Sd) UCL | 2.1250E-5 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2.1534E-5 | 99% Chebyshev(Mean, Sd) UCL | 2.2090E-5 |

### Suggested UCL to Use

95% Student's-t UCL 2.0854E-5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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### General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 2 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 3.1 | Minimum Non-Detect | 0.26 |
| Maximum Detect | 3.6 | Maximum Non-Detect | 2.6 |
| Variance Detects | 0.125 | Percent Non-Detects | 96% |
| Mean Detects | 3.35 | SD Detects | 0.354 |
| Median Detects | 3.35 | CV Detects | 0.106 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 1.206 | SD of Logged Detects | 0.106 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

### Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

### Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.384 | KM Standard Error of Mean | 0.122 |

| | | | |
|---|---|---|---|
| KM SD | 0.608 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 0.587 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 0.583 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 0.748 | 95% KM Chebyshev UCL | 0.913 |
| 97.5% KM Chebyshev UCL | 1.142 | 99% KM Chebyshev UCL | 1.593 |

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 179.2 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 0.0187 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 716.9 | nu star (bias corrected) | N/A |
| Mean (detects) | 3.35 | | |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.384 | SD (KM) | 0.608 |
| Variance (KM) | 0.369 | SE of Mean (KM) | 0.122 |
| k hat (KM) | 0.399 | k star (KM) | 0.388 |
| nu hat (KM) | 39.86 | nu star (KM) | 38.8 |
| theta hat (KM) | 0.962 | theta star (KM) | 0.989 |
| 80% gamma percentile (KM) | 0.617 | 90% gamma percentile (KM) | 1.089 |
| 95% gamma percentile (KM) | 1.611 | 99% gamma percentile (KM) | 2.926 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0452 |
| Approximate Chi Square Value (38.80, α) | 25.54 | Adjusted Chi Square Value (38.80, β) | 25.22 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.583 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.59 |

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 1.262 | Mean in Log Scale | 0.12 |
| SD in Original Scale | 0.648 | SD in Log Scale | 0.475 |
| 95% t UCL (assumes normality of ROS data) | 1.416 | 95% Percentile Bootstrap UCL | 1.418 |
| 95% BCA Bootstrap UCL | 1.445 | 95% Bootstrap t UCL | 1.443 |
| 95% H-UCL (Log ROS) | 1.433 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.245 | KM Geo Mean | 0.288 |
| KM SD (logged) | 0.501 | 95% Critical H Value (KM-Log) | 1.891 |
| KM Standard Error of Mean (logged) | 0.1 | 95% H-UCL (KM -Log) | 0.374 |
| KM SD (logged) | 0.501 | 95% Critical H Value (KM-Log) | 1.891 |
| KM Standard Error of Mean (logged) | 0.1 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 0.489 | Mean in Log Scale | -1.001 |
| SD in Original Scale | 0.616 | SD in Log Scale | 0.647 |
| 95% t UCL (Assumes normality) | 0.635 | 95% H-Stat UCL | 0.545 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 0.587 | KM H-UCL | 0.374 |
| 95% KM (BCA) UCL | N/A | | |

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 15 |
| Number of Detects | 13 | Number of Non-Detects | 38 |
| Number of Distinct Detects | 12 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.9 | Minimum Non-Detect | 0.49 |
| Maximum Detect | 59 | Maximum Non-Detect | 25000 |
| Variance Detects | 237.6 | Percent Non-Detects | 74.51% |
| Mean Detects | 8.769 | SD Detects | 15.41 |
| Median Detects | 3.5 | CV Detects | 1.758 |
| Skewness Detects | 3.348 | Kurtosis Detects | 11.66 |
| Mean of Logged Detects | 1.452 | SD of Logged Detects | 1.13 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.493 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.391 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data Not Normal at 5% Significance Level |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 6.295 | KM Standard Error of Mean | 3.053 |
| KM SD | 12.78 | 95% KM (BCA) UCL | 12.2 |
| 95% KM (t) UCL | 11.41 | 95% KM (Percentile Bootstrap) UCL | 11.94 |
| 95% KM (z) UCL | 11.32 | 95% KM Bootstrap t UCL | 24.88 |
| 90% KM Chebyshev UCL | 15.46 | 95% KM Chebyshev UCL | 19.6 |
| 97.5% KM Chebyshev UCL | 25.36 | 99% KM Chebyshev UCL | 36.68 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.912 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.767 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.235 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.245 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.822 | k star (bias corrected MLE) | 0.683 |

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 10.67 | Theta star (bias corrected MLE) | 12.83 |
| nu hat (MLE) | 21.37 | nu star (bias corrected) | 17.77 |
| Mean (detects) | 8.769 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 6.479 |
| Maximum | 59 | Median | 1.545 |
| SD | 11.7 | CV | 1.806 |
| k hat (MLE) | 0.252 | k star (bias corrected MLE) | 0.25 |
| Theta hat (MLE) | 25.75 | Theta star (bias corrected MLE) | 25.93 |
| nu hat (MLE) | 25.66 | nu star (bias corrected) | 25.49 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (25.49, α) | 14.99 | Adjusted Chi Square Value (25.49, β) | 14.75 |
| 95% Gamma Approximate UCL (use when n>=50) | 11.02 | 95% Gamma Adjusted UCL (use when n<50) | 11.2 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 6.295 | SD (KM) | 12.78 |
| Variance (KM) | 163.4 | SE of Mean (KM) | 3.053 |
| k hat (KM) | 0.242 | k star (KM) | 0.241 |
| nu hat (KM) | 24.73 | nu star (KM) | 24.61 |
| theta hat (KM) | 25.96 | theta star (KM) | 26.09 |
| 80% gamma percentile (KM) | 9.024 | 90% gamma percentile (KM) | 18.94 |
| 95% gamma percentile (KM) | 30.79 | 99% gamma percentile (KM) | 62.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (24.61, α) | 14.32 | Adjusted Chi Square Value (24.61, β) | 14.09 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 10.82 | 95% Gamma Adjusted KM-UCL (use when n<50) | 11 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.931 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.149 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 5.66 | Mean in Log Scale | 0.818 |
| SD in Original Scale | 10.1 | SD in Log Scale | 1.373 |
| 95% t UCL (assumes normality of ROS data) | 8.031 | 95% Percentile Bootstrap UCL | 8.131 |
| 95% BCA Bootstrap UCL | 8.881 | 95% Bootstrap t UCL | 10.16 |
| 95% H-UCL (Log ROS) | 9.862 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.937 | KM Geo Mean | 2.552 |
| KM SD (logged) | 1.204 | 95% Critical H Value (KM-Log) | 2.527 |
| KM Standard Error of Mean (logged) | 0.299 | 95% H-UCL (KM -Log) | 8.099 |
| KM SD (logged) | 1.204 | 95% Critical H Value (KM-Log) | 2.527 |

KM Standard Error of Mean (logged) 0.299

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 7845 | Mean in Log Scale | 6.251 |
| SD in Original Scale | 6101 | SD in Log Scale | 4.241 |
| 95% t UCL (Assumes normality) | 9277 | 95% H-Stat UCL | 2.449E+8 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL 10.82

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 19 |
| Number of Detects | 16 | Number of Non-Detects | 34 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 14 | Minimum Non-Detect | 0.2 |
| Maximum Detect | 4800 | Maximum Non-Detect | 0.8 |
| Variance Detects | 2251925 | Percent Non-Detects | 68% |
| Mean Detects | 2589 | SD Detects | 1501 |
| Median Detects | 2650 | CV Detects | 0.58 |
| Skewness Detects | -0.627 | Kurtosis Detects | -0.295 |
| Mean of Logged Detects | 7.088 | SD of Logged Detects | 2.049 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.91 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.176 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.213 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 828.5 | KM Standard Error of Mean | 213.3 |
| KM SD | 1461 | 95% KM (BCA) UCL | 1171 |
| 95% KM (t) UCL | 1186 | 95% KM (Percentile Bootstrap) UCL | 1187 |
| 95% KM (z) UCL | 1179 | 95% KM Bootstrap t UCL | 1210 |
| 90% KM Chebyshev UCL | 1469 | 95% KM Chebyshev UCL | 1758 |
| 97.5% KM Chebyshev UCL | 2161 | 99% KM Chebyshev UCL | 2951 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 2.522 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.773 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.365 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.223 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.774 | k star (bias corrected MLE) | 0.67 |
| Theta hat (MLE) | 3346 | Theta star (bias corrected MLE) | 3862 |
| nu hat (MLE) | 24.76 | nu star (bias corrected) | 21.45 |
| Mean (detects) | 2589 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 985 |
| Maximum | 4800 | Median | 256.2 |
| SD | 1409 | CV | 1.431 |
| k hat (MLE) | 0.185 | k star (bias corrected MLE) | 0.187 |
| Theta hat (MLE) | 5317 | Theta star (bias corrected MLE) | 5254 |
| nu hat (MLE) | 18.53 | nu star (bias corrected) | 18.75 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (18.75, α) | 9.933 | Adjusted Chi Square Value (18.75, β) | 9.742 |
| 95% Gamma Approximate UCL (use when n>=50) | 1859 | 95% Gamma Adjusted UCL (use when n<50) | 1896 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 828.5 | SD (KM) | 1461 |
| Variance (KM) | 2133556 | SE of Mean (KM) | 213.3 |
| k hat (KM) | 0.322 | k star (KM) | 0.316 |
| nu hat (KM) | 32.17 | nu star (KM) | 31.58 |
| theta hat (KM) | 2575 | theta star (KM) | 2624 |
| 80% gamma percentile (KM) | 1286 | 90% gamma percentile (KM) | 2428 |
| 95% gamma percentile (KM) | 3728 | 99% gamma percentile (KM) | 7085 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (31.58, α) | 19.74 | Adjusted Chi Square Value (31.58, β) | 19.46 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1326 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1345 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.615 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.402 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.213 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 850.1 | Mean in Log Scale | 3.926 |
| SD in Original Scale | 1463 | SD in Log Scale | 2.855 |

| | | | |
|---|---|---|---|
| 95% t UCL (assumes normality of ROS data) | 1197 | 95% Percentile Bootstrap UCL | 1195 |
| 95% BCA Bootstrap UCL | 1216 | 95% Bootstrap t UCL | 1270 |
| 95% H-UCL (Log ROS) | 21717 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.174 | KM Geo Mean | 3.234 |
| KM SD (logged) | 4.21 | 95% Critical H Value (KM-Log) | 6.936 |
| KM Standard Error of Mean (logged) | 0.615 | 95% H-UCL (KM -Log) | 1477191 |
| KM SD (logged) | 4.21 | 95% Critical H Value (KM-Log) | 6.936 |
| KM Standard Error of Mean (logged) | 0.615 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 828.6 | Mean in Log Scale | 1.431 |
| SD in Original Scale | 1475 | SD in Log Scale | 4.106 |
| 95% t UCL (Assumes normality) | 1178 | 95% H-Stat UCL | 1016767 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 1186

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 29 |
| Number of Detects | 30 | Number of Non-Detects | 21 |
| Number of Distinct Detects | 26 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 2.3 | Minimum Non-Detect | 2.7 |
| Maximum Detect | 2900 | Maximum Non-Detect | 10000 |
| Variance Detects | 284928 | Percent Non-Detects | 41.18% |
| Mean Detects | 140.7 | SD Detects | 533.8 |
| Median Detects | 10.5 | CV Detects | 3.793 |
| Skewness Detects | 5.119 | Kurtosis Detects | 26.98 |
| Mean of Logged Detects | 2.806 | SD of Logged Detects | 1.649 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.278 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.927 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.441 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.159 | Detected Data Not Normal at 5% Significance Level | |

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 124.5 | KM Standard Error of Mean | 86.34 |

| | | | |
|---|---|---|---|
| KM SD | 495 | 95% KM (BCA) UCL | 316.5 |
| 95% KM (t) UCL | 269.2 | 95% KM (Percentile Bootstrap) UCL | 283.8 |
| 95% KM (z) UCL | 266.5 | 95% KM Bootstrap t UCL | 1804 |
| 90% KM Chebyshev UCL | 383.5 | 95% KM Chebyshev UCL | 500.8 |
| 97.5% KM Chebyshev UCL | 663.7 | 99% KM Chebyshev UCL | 983.5 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 4.373 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.85 | Detected Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.281 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.173 | Detected Data Not Gamma Distributed at 5% Significance Level |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.319 | k star (bias corrected MLE) | 0.309 |
| Theta hat (MLE) | 441.3 | Theta star (bias corrected MLE) | 455.1 |
| nu hat (MLE) | 19.13 | nu star (bias corrected) | 18.55 |
| Mean (detects) | 140.7 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 133.9 |
| Maximum | 2900 | Median | 5.89 |
| SD | 442.8 | CV | 3.307 |
| k hat (MLE) | 0.194 | k star (bias corrected MLE) | 0.196 |
| Theta hat (MLE) | 689.3 | Theta star (bias corrected MLE) | 683.5 |
| nu hat (MLE) | 19.81 | nu star (bias corrected) | 19.98 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (19.98, α) | 10.84 | Adjusted Chi Square Value (19.98, β) | 10.64 |
| 95% Gamma Approximate UCL (use when n>=50) | 246.8 | 95% Gamma Adjusted UCL (use when n<50) | 251.4 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 124.5 | SD (KM) | 495 |
| Variance (KM) | 245016 | SE of Mean (KM) | 86.34 |
| k hat (KM) | 0.0632 | k star (KM) | 0.0726 |
| nu hat (KM) | 6.448 | nu star (KM) | 7.402 |
| theta hat (KM) | 1969 | theta star (KM) | 1715 |
| 80% gamma percentile (KM) | 48.37 | 90% gamma percentile (KM) | 276 |
| 95% gamma percentile (KM) | 718.7 | 99% gamma percentile (KM) | 2307 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (7.40, α) | 2.394 | Adjusted Chi Square Value (7.40, β) | 2.312 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 384.8 | 95% Gamma Adjusted KM-UCL (use when n<50) | 398.5 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.864 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.927 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.158 | Lilliefors GOF Test |

| | | |
|---|---|---|
| 5% Lilliefors Critical Value | 0.159 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 95.27 | Mean in Log Scale | 2.424 |
| SD in Original Scale | 411.9 | SD in Log Scale | 1.809 |
| 95% t UCL (assumes normality of ROS data) | 191.9 | 95% Percentile Bootstrap UCL | 204.4 |
| 95% BCA Bootstrap UCL | 282.4 | 95% Bootstrap t UCL | 851.4 |
| 95% H-UCL (Log ROS) | 134.1 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 2.574 | KM Geo Mean | 13.12 |
| KM SD (logged) | 1.65 | 95% Critical H Value (KM-Log) | 3.071 |
| KM Standard Error of Mean (logged) | 0.288 | 95% H-UCL (KM -Log) | 104.8 |
| KM SD (logged) | 1.65 | 95% Critical H Value (KM-Log) | 3.071 |
| KM Standard Error of Mean (logged) | 0.288 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1750 | Mean in Log Scale | 4.518 |
| SD in Original Scale | 2357 | SD in Log Scale | 3.187 |
| 95% t UCL (Assumes normality) | 2303 | 95% H-Stat UCL | 154812 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL 104.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 15 |
| Number of Detects | 13 | Number of Non-Detects | 37 |
| Number of Distinct Detects | 12 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 128 | Minimum Non-Detect | 0.5 |
| Maximum Detect | 490 | Maximum Non-Detect | 0.85 |
| Variance Detects | 13212 | Percent Non-Detects | 74% |
| Mean Detects | 294.8 | SD Detects | 114.9 |
| Median Detects | 300 | CV Detects | 0.39 |
| Skewness Detects | 0.161 | Kurtosis Detects | -1.068 |
| Mean of Logged Detects | 5.608 | SD of Logged Detects | 0.423 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.956 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data appear Normal at 5% Significance Level |

| | | | |
|---|---|---|---|
| Lilliefors Test Statistic | 0.138 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 77.01 | KM Standard Error of Mean | 20.73 |
| KM SD | 140.8 | 95% KM (BCA) UCL | 111.7 |
| 95% KM (t) UCL | 111.8 | 95% KM (Percentile Bootstrap) UCL | 111.1 |
| 95% KM (z) UCL | 111.1 | 95% KM Bootstrap t UCL | 113.3 |
| 90% KM Chebyshev UCL | 139.2 | 95% KM Chebyshev UCL | 167.4 |
| 97.5% KM Chebyshev UCL | 206.5 | 99% KM Chebyshev UCL | 283.3 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.298 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.735 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.151 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.237 | Detected data appear Gamma Distributed at 5% Significance Level | |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 6.59 | k star (bias corrected MLE) | 5.121 |
| Theta hat (MLE) | 44.73 | Theta star (bias corrected MLE) | 57.57 |
| nu hat (MLE) | 171.3 | nu star (bias corrected) | 133.1 |
| Mean (detects) | 294.8 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 93.98 |
| Maximum | 490 | Median | 13.7 |
| SD | 137.2 | CV | 1.46 |
| k hat (MLE) | 0.176 | k star (bias corrected MLE) | 0.179 |
| Theta hat (MLE) | 533.7 | Theta star (bias corrected MLE) | 525.4 |
| nu hat (MLE) | 17.61 | nu star (bias corrected) | 17.89 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (17.89, α) | 9.31 | Adjusted Chi Square Value (17.89, β) | 9.125 |
| 95% Gamma Approximate UCL (use when n>=50) | 180.6 | 95% Gamma Adjusted UCL (use when n<50) | 184.2 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 77.01 | SD (KM) | 140.8 |
| Variance (KM) | 19832 | SE of Mean (KM) | 20.73 |
| k hat (KM) | 0.299 | k star (KM) | 0.294 |
| nu hat (KM) | 29.9 | nu star (KM) | 29.44 |
| theta hat (KM) | 257.5 | theta star (KM) | 261.6 |
| 80% gamma percentile (KM) | 117.5 | 90% gamma percentile (KM) | 227.6 |
| 95% gamma percentile (KM) | 354.4 | 99% gamma percentile (KM) | 684.6 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (29.44, α) | 18.06 | Adjusted Chi Square Value (29.44, β) | 17.79 |

| | | | |
|---|---|---|---|
| 95% Gamma Approximate KM-UCL (use when n>=50) | 125.6 | 95% Gamma Adjusted KM-UCL (use when n<50) | 127.5 |

Lognormal GOF Test on Detected Observations Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.947 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.173 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level | |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 128 | Mean in Log Scale | 4.481 |
| SD in Original Scale | 119.1 | SD in Log Scale | 0.871 |
| 95% t UCL (assumes normality of ROS data) | 156.2 | 95% Percentile Bootstrap UCL | 156.1 |
| 95% BCA Bootstrap UCL | 158.6 | 95% Bootstrap t UCL | 162.3 |
| 95% H-UCL (Log ROS) | 170 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.945 | KM Geo Mean | 2.573 |
| KM SD (logged) | 2.772 | 95% Critical H Value (KM-Log) | 4.741 |
| KM Standard Error of Mean (logged) | 0.408 | 95% H-UCL (KM -Log) | 783.8 |
| KM SD (logged) | 2.772 | 95% Critical H Value (KM-Log) | 4.741 |
| KM Standard Error of Mean (logged) | 0.408 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 76.93 | Mean in Log Scale | 0.749 |
| SD in Original Scale | 142.3 | SD in Log Scale | 2.92 |
| 95% t UCL (Assumes normality) | 110.7 | 95% H-Stat UCL | 1192 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 111.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 17 |
| Number of Detects | 17 | Number of Non-Detects | 33 |
| Number of Distinct Detects | 14 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 1.8 | Minimum Non-Detect | 0.18 |
| Maximum Detect | 440 | Maximum Non-Detect | 0.8 |
| Variance Detects | 13782 | Percent Non-Detects | 66% |
| Mean Detects | 152.4 | SD Detects | 117.4 |
| Median Detects | 110 | CV Detects | 0.77 |

| | | | |
|---|---|---|---|
| Skewness Detects | 1.019 | Kurtosis Detects | 0.968 |
| Mean of Logged Detects | 4.515 | SD of Logged Detects | 1.396 |

Normal GOF Test on Detects Only

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.9 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.892 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.229 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.207 | Detected Data Not Normal at 5% Significance Level | |

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 51.93 | KM Standard Error of Mean | 14.29 |
| KM SD | 98.03 | 95% KM (BCA) UCL | 75.72 |
| 95% KM (t) UCL | 75.89 | 95% KM (Percentile Bootstrap) UCL | 76.01 |
| 95% KM (z) UCL | 75.44 | 95% KM Bootstrap t UCL | 79.85 |
| 90% KM Chebyshev UCL | 94.8 | 95% KM Chebyshev UCL | 114.2 |
| 97.5% KM Chebyshev UCL | 141.2 | 99% KM Chebyshev UCL | 194.1 |

Gamma GOF Tests on Detected Observations Only

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.827 | Anderson-Darling GOF Test | |
| 5% A-D Critical Value | 0.764 | Detected Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.285 | Kolmogorov-Smirnov GOF | |
| 5% K-S Critical Value | 0.215 | Detected Data Not Gamma Distributed at 5% Significance Level | |

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 1.115 | k star (bias corrected MLE) | 0.958 |
| Theta hat (MLE) | 136.6 | Theta star (bias corrected MLE) | 159.1 |
| nu hat (MLE) | 37.93 | nu star (bias corrected) | 32.57 |
| Mean (detects) | 152.4 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 51.96 |
| Maximum | 440 | Median | 0.01 |
| SD | 99.01 | CV | 1.905 |
| k hat (MLE) | 0.145 | k star (bias corrected MLE) | 0.15 |
| Theta hat (MLE) | 358.2 | Theta star (bias corrected MLE) | 347.1 |
| nu hat (MLE) | 14.51 | nu star (bias corrected) | 14.97 |
| Adjusted Level of Significance (β) | 0.0452 | | |
| Approximate Chi Square Value (14.97, α) | 7.241 | Adjusted Chi Square Value (14.97, β) | 7.081 |
| 95% Gamma Approximate UCL (use when n>=50) | 107.4 | 95% Gamma Adjusted UCL (use when n<50) | 109.9 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 51.93 | SD (KM) | 98.03 |
| Variance (KM) | 9610 | SE of Mean (KM) | 14.29 |
| k hat (KM) | 0.281 | k star (KM) | 0.277 |
| nu hat (KM) | 28.07 | nu star (KM) | 27.72 |

| | | | |
|---|---|---|---|
| theta hat (KM) | 185 | theta star (KM) | 187.4 |
| 80% gamma percentile (KM) | 77.98 | 90% gamma percentile (KM) | 154.5 |
| 95% gamma percentile (KM) | 243.6 | 99% gamma percentile (KM) | 477.5 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (27.72, α) | 16.71 | Adjusted Chi Square Value (27.72, β) | 16.45 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 86.16 | 95% Gamma Adjusted KM-UCL (use when n<50) | 87.49 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.792 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.892 | Detected Data Not Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.346 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.207 | Detected Data Not Lognormal at 5% Significance Level |

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 54.93 | Mean in Log Scale | 2.125 |
| SD in Original Scale | 97.51 | SD in Log Scale | 2.195 |
| 95% t UCL (assumes normality of ROS data) | 78.05 | 95% Percentile Bootstrap UCL | 77.9 |
| 95% BCA Bootstrap UCL | 80.8 | 95% Bootstrap t UCL | 86.75 |
| 95% H-UCL (Log ROS) | 316.3 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 0.403 | KM Geo Mean | 1.497 |
| KM SD (logged) | 3.055 | 95% Critical H Value (KM-Log) | 5.167 |
| KM Standard Error of Mean (logged) | 0.445 | 95% H-UCL (KM -Log) | 1518 |
| KM SD (logged) | 3.055 | 95% Critical H Value (KM-Log) | 5.167 |
| KM Standard Error of Mean (logged) | 0.445 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 52.04 | Mean in Log Scale | 0.764 |
| SD in Original Scale | 98.97 | SD in Log Scale | 2.863 |
| 95% t UCL (Assumes normality) | 75.51 | 95% H-Stat UCL | 949.5 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 75.89

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

| User Selected Options | |
|---|---|
| Date/Time of Computation | ProUCL 5.112/9/2020 4:02:57 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (so | c/s | total soil | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 28 | Number of Distinct Observations | 10 |
| Number of Detects | 1 | Number of Non-Detects | 27 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 9 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (so | c/s | total soil | include | thallium | tmet) was not processed!

Conc (so | n/w | total soil | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (so | n/w | total soil | include | thallium | tmet) was not processed!

UCL Statistics for Data Sets with Non-Detects

| User Selected Options | |
|---|---|
| Date/Time of Computation | ProUCL 5.111/25/2020 12:55:05 PM |
| From File | ProUCL Input_2020.11.25.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (sd | downgradient estuarine | all | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 17 |
| Number of Detects | 8 | Number of Non-Detects | 11 |
| Number of Distinct Detects | 6 | Number of Distinct Non-Detects | 11 |
| Minimum Detect | 0.15 | Minimum Non-Detect | 2.4 |
| Maximum Detect | 0.5 | Maximum Non-Detect | 4.6 |
| Variance Detects | 0.0137 | Percent Non-Detects | 57.89% |
| Mean Detects | 0.243 | SD Detects | 0.117 |

| | | | |
|---|---|---|---|
| Median Detects | 0.22 | CV Detects | 0.483 |
| Skewness Detects | 1.745 | Kurtosis Detects | 3.471 |
| Mean of Logged Detects | -1.5 | SD of Logged Detects | 0.418 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.786 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.249 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 0.243 | KM Standard Error of Mean | 0.0414 |
| KM SD | 0.11 | 95% KM (BCA) UCL | 0.317 |
| 95% KM (t) UCL | 0.314 | 95% KM (Percentile Bootstrap) UCL | 0.317 |
| 95% KM (z) UCL | 0.311 | 95% KM Bootstrap t UCL | 0.382 |
| 90% KM Chebyshev UCL | 0.367 | 95% KM Chebyshev UCL | 0.423 |
| 97.5% KM Chebyshev UCL | 0.501 | 99% KM Chebyshev UCL | 0.655 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.556 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.718 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.214 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.295 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 6.151 | k star (bias corrected MLE) | 3.928 |
| Theta hat (MLE) | 0.0394 | Theta star (bias corrected MLE) | 0.0617 |
| nu hat (MLE) | 98.42 | nu star (bias corrected) | 62.85 |
| Mean (detects) | 0.243 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 0.15 | Mean | 0.237 |
| Maximum | 0.5 | Median | 0.232 |
| SD | 0.0733 | CV | 0.31 |
| k hat (MLE) | 14.3 | k star (bias corrected MLE) | 12.07 |
| Theta hat (MLE) | 0.0165 | Theta star (bias corrected MLE) | 0.0196 |
| nu hat (MLE) | 543.3 | nu star (bias corrected) | 458.8 |
| Adjusted Level of Significance (β) | 0.0369 | | |
| Approximate Chi Square Value (458.82, α) | 410.2 | Adjusted Chi Square Value (458.82, β) | 406.1 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.265 | 95% Gamma Adjusted UCL (use when n<50) | 0.267 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 0.243 | SD (KM) | 0.11 |
| Variance (KM) | 0.012 | SE of Mean (KM) | 0.0414 |
| k hat (KM) | 4.893 | k star (KM) | 4.155 |

| | | | |
|---|---|---|---|
| nu hat (KM) | 185.9 | nu star (KM) | 157.9 |
| theta hat (KM) | 0.0496 | theta star (KM) | 0.0584 |
| 80% gamma percentile (KM) | 0.333 | 90% gamma percentile (KM) | 0.402 |
| 95% gamma percentile (KM) | 0.465 | 99% gamma percentile (KM) | 0.601 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (157.91, α) | 129.9 | Adjusted Chi Square Value (157.91, β) | 127.6 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.295 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.3 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.871 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.196 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.283 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 0.231 | Mean in Log Scale | -1.5 |
| SD in Original Scale | 0.0737 | SD in Log Scale | 0.261 |
| 95% t UCL (assumes normality of ROS data) | 0.261 | 95% Percentile Bootstrap UCL | 0.26 |
| 95% BCA Bootstrap UCL | 0.274 | 95% Bootstrap t UCL | 0.28 |
| 95% H-UCL (Log ROS) | 0.258 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | -1.5 | KM Geo Mean | 0.223 |
| KM SD (logged) | 0.391 | 95% Critical H Value (KM-Log) | 1.913 |
| KM Standard Error of Mean (logged) | 0.148 | 95% H-UCL (KM -Log) | 0.287 |
| KM SD (logged) | 0.391 | 95% Critical H Value (KM-Log) | 1.913 |
| KM Standard Error of Mean (logged) | 0.148 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 1.115 | Mean in Log Scale | -0.32 |
| SD in Original Scale | 0.815 | SD in Log Scale | 1.079 |
| 95% t UCL (Assumes normality) | 1.439 | 95% H-Stat UCL | 2.599 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL 0.314

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

| User Selected Options | |
|---|---|
| Date/Time of Computation | ProUCL 5.112/9/2020 11:42:00 AM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (sw | downgradient estuarine | all | include | 1,1,2,2-tetrachloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 1,1,2,2-tetrachloroethane | voc) was not processed!

Conc (sw | downgradient estuarine | all | include | 1,2,4-trichlorobenzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 1,2,4-trichlorobenzene | voc) was not processed!

Conc (sw | downgradient estuarine | all | include | 1,2-dibromo-3-chloropropane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 1,2-dibromo-3-chloropropane | voc) was not processed!

Conc (sw | downgradient estuarine | all | include | 1,2-dibromoethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 1,2-dibromoethane | voc) was not processed!

Conc (sw | downgradient estuarine | all | include | 2,4-dinitrotoluene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 2,4-dinitrotoluene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | 2,6-dinitrotoluene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 2,6-dinitrotoluene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | 2-nitrophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 2-nitrophenol | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | 3,3'-dichlorobenzidine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 3 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 3 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 3,3'-dichlorobenzidine | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | 4,4'-ddd | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 4,4'-ddd | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | 4,4'-dde | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 3 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 3 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 4,4'-dde | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | 4,4'-ddt | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 4,4'-ddt | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | 4,6-dinitro-o-cresol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | 4,6-dinitro-o-cresol | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | aldrin | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | aldrin | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | alpha-bhc | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | alpha-bhc | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | aroclor 1221 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |

| | | | |
|---|---|---|---|
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | aroclor 1221 | pcb) was not processed!

Conc (sw | downgradient estuarine | all | include | benzo(a)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | benzo(a)anthracene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | benzo(a)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | benzo(a)pyrene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | benzo(b)fluoranthene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | benzo(b)fluoranthene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | benzo(k)fluoranthene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | benzo(k)fluoranthene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | bis(2-chloroethyl)ether | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | bis(2-chloroethyl)ether | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | bis(2-ethylhexyl)phthalate | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | bis(2-ethylhexyl)phthalate | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | butyl benzyl phthalate | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | butyl benzyl phthalate | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | chrysene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | chrysene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | cyanide | cyanide)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | cyanide | cyanide) was not processed!

Conc (sw | downgradient estuarine | all | include | dibenzo(a,h)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | dibenzo(a,h)anthracene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | dieldrin | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | dieldrin | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | heptachlor | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | heptachlor | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | heptachlor epoxide | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 3 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 3 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | heptachlor epoxide | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | hexachlorobenzene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | hexachlorobenzene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | hexachlorobutadiene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | hexachlorobutadiene | voc) was not processed!

Conc (sw | downgradient estuarine | all | include | hexachloroethane | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | hexachloroethane | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | indeno(1,2,3-cd)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | indeno(1,2,3-cd)pyrene | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | n-nitroso-di-n-propylamine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | n-nitroso-di-n-propylamine | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | pentachlorophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | pentachlorophenol | svoc) was not processed!

Conc (sw | downgradient estuarine | all | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | thallium | tmet) was not processed!

Conc (sw | downgradient estuarine | all | include | toxaphene | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | toxaphene | pest) was not processed!

Conc (sw | downgradient estuarine | all | include | vinyl chloride | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 7 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (sw | downgradient estuarine | all | include | vinyl chloride | voc) was not processed!

UCL Statistics for Data Sets with Non-Detects

| | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.112/17/2020 3:56:50 PM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

Conc (wg | surficial aquifer | site-wide | include | 1,1,2,2-tetrachloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,1,2,2-tetrachloroethane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 1,1,2-trichloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,1,2-trichloroethane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 1,2,4-trichlorobenzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,2,4-trichlorobenzene | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 1,2-dibromo-3-chloropropane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,2-dibromo-3-chloropropane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 1,2-dibromoethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,2-dibromoethane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 1,2-dichloropropane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,2-dichloropropane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 1,4-dichlorobenzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 1,4-dichlorobenzene | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 2,4,6-trichlorophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 2,4,6-trichlorophenol | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 2,4-dinitrotoluene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 2,4-dinitrotoluene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 2,6-dinitrotoluene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 2,6-dinitrotoluene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 2-hexanone | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 2-hexanone | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 2-nitrophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 2-nitrophenol | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 3,3'-dichlorobenzidine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 48 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 48 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 3,3'-dichlorobenzidine | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 4,6-dinitro-o-cresol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 4,6-dinitro-o-cresol | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 4-chloroaniline | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 4 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 4 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 4-chloroaniline | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | 4-nitrophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | 4-nitrophenol | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aldrin | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aldrin | pest) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aroclor 1221 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aroclor 1221 | pcb) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aroclor 1232 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aroclor 1232 | pcb) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aroclor 1242 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aroclor 1242 | pcb) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aroclor 1248 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aroclor 1248 | pcb) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aroclor 1254 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |

| | | | |
|---|---|---|---|
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aroclor 1254 | pcb) was not processed!

Conc (wg | surficial aquifer | site-wide | include | aroclor 1260 | pcb)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | aroclor 1260 | pcb) was not processed!

Conc (wg | surficial aquifer | site-wide | include | atrazine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | atrazine | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | bis(2-chloroethyl)ether | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | bis(2-chloroethyl)ether | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | bromodichloromethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | bromodichloromethane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | bromoform | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | bromoform | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | bromomethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | bromomethane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | carbon tetrachloride | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | carbon tetrachloride | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | cis-1,3-dichloropropene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | cis-1,3-dichloropropene | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | cyanide | cyanide)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | cyanide | cyanide) was not processed!

Conc (wg | surficial aquifer | site-wide | include | dibenzo(a,h)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | dibenzo(a,h)anthracene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | dibromochloromethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | dibromochloromethane | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | dieldrin | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | dieldrin | pest) was not processed!

Conc (wg | surficial aquifer | site-wide | include | heptachlor | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | heptachlor | pest) was not processed!

Conc (wg | surficial aquifer | site-wide | include | heptachlor epoxide | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | heptachlor epoxide | pest) was not processed!

Conc (wg | surficial aquifer | site-wide | include | hexachlorobenzene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | hexachlorobenzene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | hexachlorobutadiene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | hexachlorobutadiene | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | hexachlorocyclopentadiene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | hexachlorocyclopentadiene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | hexachloroethane | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | hexachloroethane | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | indeno(1,2,3-cd)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 6 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 5 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | indeno(1,2,3-cd)pyrene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | nitrobenzene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | nitrobenzene | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | n-nitroso-di-n-propylamine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | n-nitroso-di-n-propylamine | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | pentachlorophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 0 | Number of Non-Detects | 51 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 5 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | pentachlorophenol | svoc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | selenium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 9 |
| Number of Detects | 6 | Number of Non-Detects | 45 |
| Number of Distinct Detects | 6 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 2 | Minimum Non-Detect | 6.2 |
| Maximum Detect | 4.8 | Maximum Non-Detect | 17 |
| Variance Detects | 1.076 | Percent Non-Detects | 88.24% |
| Mean Detects | 3.2 | SD Detects | 1.037 |
| Median Detects | 3.25 | CV Detects | 0.324 |
| Skewness Detects | 0.406 | Kurtosis Detects | -0.386 |
| Mean of Logged Detects | 1.118 | SD of Logged Detects | 0.331 |

Normal GOF Test on Detects Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.954 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.788 | Detected Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.166 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.325 | Detected Data appear Normal at 5% Significance Level |

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

| | | | |
|---|---|---|---|
| KM Mean | 3.2 | KM Standard Error of Mean | 0.423 |
| KM SD | 0.947 | 95% KM (BCA) UCL | 3.867 |
| 95% KM (t) UCL | 3.91 | 95% KM (Percentile Bootstrap) UCL | 3.883 |
| 95% KM (z) UCL | 3.897 | 95% KM Bootstrap t UCL | 4.135 |
| 90% KM Chebyshev UCL | 4.47 | 95% KM Chebyshev UCL | 5.046 |
| 97.5% KM Chebyshev UCL | 5.845 | 99% KM Chebyshev UCL | 7.414 |

Gamma GOF Tests on Detected Observations Only

| | | |
|---|---|---|
| A-D Test Statistic | 0.241 | Anderson-Darling GOF Test |
| 5% A-D Critical Value | 0.698 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.194 | Kolmogorov-Smirnov GOF |
| 5% K-S Critical Value | 0.332 | Detected data appear Gamma Distributed at 5% Significance Level |

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

| | | | |
|---|---|---|---|
| k hat (MLE) | 11.32 | k star (bias corrected MLE) | 5.77 |
| Theta hat (MLE) | 0.283 | Theta star (bias corrected MLE) | 0.555 |
| nu hat (MLE) | 135.8 | nu star (bias corrected) | 69.24 |
| Mean (detects) | 3.2 | | |

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

| | | | |
|---|---|---|---|
| Minimum | 1.073 | Mean | 3.229 |
| Maximum | 6.163 | Median | 3.134 |
| SD | 1.14 | CV | 0.353 |
| k hat (MLE) | 7.789 | k star (bias corrected MLE) | 7.344 |
| Theta hat (MLE) | 0.415 | Theta star (bias corrected MLE) | 0.44 |
| nu hat (MLE) | 794.4 | nu star (bias corrected) | 749 |
| Adjusted Level of Significance (β) | 0.0453 | | |
| Approximate Chi Square Value (749.04, α) | 686.5 | Adjusted Chi Square Value (749.04, β) | 684.8 |
| 95% Gamma Approximate UCL (use when n>=50) | 3.523 | 95% Gamma Adjusted UCL (use when n<50) | 3.532 |

Estimates of Gamma Parameters using KM Estimates

| | | | |
|---|---|---|---|
| Mean (KM) | 3.2 | SD (KM) | 0.947 |
| Variance (KM) | 0.897 | SE of Mean (KM) | 0.423 |
| k hat (KM) | 11.42 | k star (KM) | 10.76 |
| nu hat (KM) | 1165 | nu star (KM) | 1098 |
| theta hat (KM) | 0.28 | theta star (KM) | 0.297 |
| 80% gamma percentile (KM) | 3.979 | 90% gamma percentile (KM) | 4.496 |
| 95% gamma percentile (KM) | 4.955 | 99% gamma percentile (KM) | 5.894 |

Gamma Kaplan-Meier (KM) Statistics

| | | | |
|---|---|---|---|
| Approximate Chi Square Value (N/A, α) | 1022 | Adjusted Chi Square Value (N/A, β) | 1020 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 3.438 | 95% Gamma Adjusted KM-UCL (use when n<50) | 3.445 |

Lognormal GOF Test on Detected Observations Only

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.954 | Shapiro Wilk GOF Test |
| 5% Shapiro Wilk Critical Value | 0.788 | Detected Data appear Lognormal at 5% Significance Level |
| Lilliefors Test Statistic | 0.174 | Lilliefors GOF Test |
| 5% Lilliefors Critical Value | 0.325 | Detected Data appear Lognormal at 5% Significance Level |

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

| | | | |
|---|---|---|---|
| Mean in Original Scale | 3.26 | Mean in Log Scale | 1.118 |
| SD in Original Scale | 1.19 | SD in Log Scale | 0.361 |
| 95% t UCL (assumes normality of ROS data) | 3.539 | 95% Percentile Bootstrap UCL | 3.538 |
| 95% BCA Bootstrap UCL | 3.558 | 95% Bootstrap t UCL | 3.555 |
| 95% H-UCL (Log ROS) | 3.573 | | |

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

| | | | |
|---|---|---|---|
| KM Mean (logged) | 1.118 | KM Geo Mean | 3.06 |
| KM SD (logged) | 0.302 | 95% Critical H Value (KM-Log) | 1.717 |
| KM Standard Error of Mean (logged) | 0.135 | 95% H-UCL (KM -Log) | 3.446 |
| KM SD (logged) | 0.302 | 95% Critical H Value (KM-Log) | 1.717 |
| KM Standard Error of Mean (logged) | 0.135 | | |

DL/2 Statistics

| DL/2 Normal | | DL/2 Log-Transformed | |
|---|---|---|---|
| Mean in Original Scale | 6.967 | Mean in Log Scale | 1.86 |
| SD in Original Scale | 2.358 | SD in Log Scale | 0.448 |
| 95% t UCL (Assumes normality) | 7.52 | 95% H-Stat UCL | 7.979 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use
95% KM (t) UCL 3.91

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Conc (wg | surficial aquifer | site-wide | include | silver | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 51 | Number of Distinct Observations | 5 |
| Number of Detects | 1 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 1 | Number of Distinct Non-Detects | 4 |

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!
uggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC,

The data set for variable Conc (wg | surficial aquifer | site-wide | include | silver | tmet) was not processed!

Conc (wg | surficial aquifer | site-wide | include | toxaphene | pest)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 12 | Number of Distinct Observations | 2 |
| Number of Detects | 0 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 2 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | toxaphene | pest) was not processed!

Conc (wg | surficial aquifer | site-wide | include | trans-1,3-dichloropropene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | trans-1,3-dichloropropene | voc) was not processed!

Conc (wg | surficial aquifer | site-wide | include | vinyl chloride | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 50 | Number of Distinct Observations | 6 |
| Number of Detects | 0 | Number of Non-Detects | 50 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 6 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | surficial aquifer | site-wide | include | vinyl chloride | voc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 1,1,2,2-tetrachloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,1,2,2-tetrachloroethane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 1,1,2-trichloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,1,2-trichloroethane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 1,1'-biphenyl | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,1'-biphenyl | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 1,2,4-trichlorobenzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,2,4-trichlorobenzene | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 1,2-dibromo-3-chloropropane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,2-dibromo-3-chloropropane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 1,2-dibromoethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,2-dibromoethane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 1,2-dichloroethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,2-dichloroethane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 1,4-dichlorobenzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 1,4-dichlorobenzene | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 2,4-dinitrotoluene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 2,4-dinitrotoluene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 2,6-dinitrotoluene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 2,6-dinitrotoluene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 2-hexanone | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 2-hexanone | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | 2-nitrophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 2-nitrophenol | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 3,3'-dichlorobenzidine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 3,3'-dichlorobenzidine | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 4,6-dinitro-o-cresol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |

| | | | |
|---|---|---|---|
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 4,6-dinitro-o-cresol | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 4-chloroaniline | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 4-chloroaniline | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | 4-nitrophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | 4-nitrophenol | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | antimony | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | antimony | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | arsenic | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | arsenic | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | atrazine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | atrazine | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | benzene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | benzene | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | benzo(a)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | benzo(a)anthracene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | benzo(a)pyrene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | benzo(a)pyrene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | bis(2-chloroethyl)ether | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | bis(2-chloroethyl)ether | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | bromodichloromethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | bromodichloromethane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | bromomethane | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |

| | | | |
|---|---|---|---|
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | bromomethane | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | cadmium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | cadmium | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | carbon tetrachloride | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | carbon tetrachloride | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | chloroform | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | chloroform | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!

If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | chromium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | chromium | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | cis-1,3-dichloropropene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | cis-1,3-dichloropropene | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | cobalt | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | cobalt | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | dibenzo(a,h)anthracene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | dibenzo(a,h)anthracene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | hexachlorobenzene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | hexachlorobenzene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | hexachlorobutadiene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | hexachlorobutadiene | voc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | hexachlorocyclopentadiene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | hexachlorocyclopentadiene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | hexachloroethane | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | hexachloroethane | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | mercury | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | mercury | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | naphthalene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | naphthalene | voc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | nitrobenzene | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | nitrobenzene | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | n-nitroso-di-n-propylamine | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | n-nitroso-di-n-propylamine | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | pentachlorophenol | svoc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | pentachlorophenol | svoc) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | selenium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | selenium | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | thallium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | thallium | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | trans-1,3-dichloropropene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | trans-1,3-dichloropropene | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | trichloroethene | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | trichloroethene | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Conc (wg | yorktown aquifer | site-wide | include | vanadium | tmet)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 3 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!
Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!
The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Conc (wg | yorktown aquifer | site-wide | include | vanadium | tmet) was not processed!

Conc (wg | yorktown aquifer | site-wide | include | vinyl chloride | voc)

General Statistics

| | | | |
|---|---|---|---|
| Total Number of Observations | 2 | Number of Distinct Observations | 1 |
| Number of Detects | 0 | Number of Non-Detects | 2 |
| Number of Distinct Detects | 0 | Number of Distinct Non-Detects | 1 |

Warning: This data set only has 2 observations!
Data set is too small to compute reliable and meaningful statistics and estimates!
The data set for variable Conc (wg | yorktown aquifer | site-wide | include | vinyl chloride | voc) was not processed!

It is suggested to collect at least 8 to 10 observations before using these statistical methods!
If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.

Table A3-15
Exposure Point Concentration Summary (Central/Southern AOC, Surface Soil)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Dioxins/Furans - Method E1613 | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | mg/kg | 2/2 | -- | -- | -- | 0.0000258 | 2.58E-05 | mg/kg | Max | (3) |
| Pesticides - Method 8081 | | | | | | | | | | |
| 4,4'-DDD | mg/kg | 7/10 | 0.0592 | 0.105 | (N) | 0.197 | 0.105 | mg/kg | UCL | (6) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | |
| Benzo(a)anthracene | mg/kg | 2/9 | 0.473 | 4.702 | (NP) | 2.49 | 2.49 | mg/kg | Max | (4) |
| Benzo(a)pyrene | mg/kg | 6/23 | 0.165 | 0.688 | (G) | 1.91 | 0.688 | mg/kg | UCL | (9) |
| Benzo(b)fluoranthene | mg/kg | 2/9 | 0.278 | 2.735 | (NP) | 1.39 | 1.39 | mg/kg | Max | (7) |
| Dibenzo(a,h)anthracene | mg/kg | 1/9 | -- | -- | -- | 0.388 | 0.388 | mg/kg | Max | (3) |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Aluminum | mg/kg | 23/23 | 12542 | 20277 | (NP) | 38600 | 20277 | mg/kg | UCL | (7) |
| Antimony | mg/kg | 9/14 | 12.57 | 32.93 | (NP) | 63.7 | 32.93 | mg/kg | UCL | (7) |
| Arsenic | mg/kg | 23/23 | 4.317 | 5.006 | (N) | 8.4 | 5.006 | mg/kg | UCL | (6) |
| Cadmium | mg/kg | 13/14 | 6.876 | 20.4 | (NP) | 21.6 | 20.4 | mg/kg | UCL | (7) |
| Chromium | mg/kg | 23/23 | 51.94 | 166.8 | (NP) | 616 | 166.8 | mg/kg | UCL | (7) |
| Cobalt | mg/kg | 23/23 | 4.983 | 10.27 | (NP) | 28 | 10.27 | mg/kg | UCL | (7) |
| Copper | mg/kg | 14/14 | 798.2 | 2419 | (G) | 5100 | 2419 | mg/kg | UCL | (9) |
| Iron | mg/kg | 23/23 | 17927 | 47264 | (NP) | 160000 | 47264 | mg/kg | UCL | (7) |
| Lead | mg/kg | 14/14 | 524.7 | 826.6 | (N) | 2120 | 524.7 | mg/kg | Mean | (5) |
| Manganese | mg/kg | 23/23 | 299.4 | 421.2 | (G) | 1490 | 421.2 | mg/kg | UCL | (9) |
| Mercury | mg/kg | 14/14 | 0.257 | 0.785 | (L) | 1.8 | 0.785 | mg/kg | UCL | (8) |
| Nickel | mg/kg | 9/9 | 60.99 | 3786 | (NP) | 502 | 502 | mg/kg | Max | (4) |
| Silver | mg/kg | 10/14 | 13.58 | 52.03 | (NP) | 84.5 | 52.03 | mg/kg | UCL | (7) |
| Thallium | mg/kg | 14/23 | 0.0679 | 0.0863 | (N) | 0.2 | 0.0863 | mg/kg | UCL | (6) |
| Vanadium | mg/kg | 14/14 | 16.5 | 21.27 | (N) | 51 | 21.27 | mg/kg | UCL | (6) |
| Zinc | mg/kg | 14/14 | 701.5 | 1695 | (G) | 4280 | 1695 | mg/kg | UCL | (9) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Data set too small to calculate meaningful statistics. Therefore, maximum concentration used for exposure point concentration.
(4) UCL exceeds maximum detected concentration. Therefore, maximum concentration used for exposure point concentration.
(5) Probabilistic modeling for lead recommends using the mean concentration.
(6) Goodness-of-Fit test indicates data are normally distributed.
(7) Goodness-of-Fit test indicates data have no discernible distribution.
(8) Goodness-of-Fit test indicates data are lognormally distributed.
(9) Goodness-of-Fit test indicates data are gamma distributed.

Table A3-16
Exposure Point Concentration Summary (Northern/Western AOC, Surface Soil)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Aluminum | mg/kg | 8/8 | 9313 | 11515 | (N) | 14300 | 11515 | mg/kg | UCL | (3) |
| Arsenic | mg/kg | 8/8 | 2.263 | 2.961 | (N) | 4.4 | 2.961 | mg/kg | UCL | (3) |
| Chromium | mg/kg | 8/8 | 8.825 | 10.65 | (N) | 11.5 | 10.65 | mg/kg | UCL | (3) |
| Cobalt | mg/kg | 8/8 | 2.75 | 3.411 | (N) | 4.3 | 3.411 | mg/kg | UCL | (3) |
| Iron | mg/kg | 8/8 | 6889 | 8699 | (N) | 10600 | 8699 | mg/kg | UCL | (3) |
| Thallium | mg/kg | 8/8 | 0.0779 | 0.109 | (N) | 0.18 | 0.109 | mg/kg | UCL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data are normally distributed.

Table A3-17
Exposure Point Concentration Summary (Central/Southern AOC, Total Soil)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft & > 2 ft) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Volatile Organic Compounds (VOCs) - Method SW8260 | | | | | | | | | | |
| 1,1,2-Trichloroethane | mg/kg | 2/15 | 3.533 | 36.32 | (NP) | 28 | 28 | mg/kg | Max | (4) |
| 2-Hexanone | mg/kg | 1/15 | -- | -- | -- | 86 | 86 | mg/kg | Max | (3) |
| Benzene | mg/kg | 4/15 | 0.276 | 1.606 | (G) | 3 | 1.606 | mg/kg | UCL | (9) |
| Ethylbenzene | mg/kg | 7/15 | 2.192 | 7.818 | (G) | 16 | 7.818 | mg/kg | UCL | (9) |
| Naphthalene | mg/kg | 9/16 | 1.527 | 2.91 | (N) | 12 | 2.91 | mg/kg | UCL | (6) |
| Xylene (total) | mg/kg | 9/16 | 10.97 | 19.03 | (N) | 59 | 19.03 | mg/kg | UCL | (6) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | |
| Benzo(a)anthracene | mg/kg | 9/25 | 1.405 | 6.272 | (L) | 27 | 6.272 | mg/kg | UCL | (8) |
| Benzo(a)pyrene | mg/kg | 15/51 | 0.612 | 3054 | (L) | 23 | 23 | mg/kg | Max | (4) |
| Benzo(b)fluoranthene | mg/kg | 9/25 | 1.467 | 6.69 | (L) | 29 | 6.69 | mg/kg | UCL | (8) |
| Dibenzo(a,h)anthracene | mg/kg | 1/9 | -- | -- | -- | 0.388 | 0.388 | mg/kg | Max | (3) |
| Indeno(1,2,3-cd)pyrene | mg/kg | 6/16 | 0.693 | 4.636 | (L) | 9.6 | 4.636 | mg/kg | UCL | (8) |
| Dioxins/Furans - Method E1613 | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | mg/kg | 2/2 | -- | -- | -- | 0.0000258 | 0.0000258 | mg/kg | Max | (3) |
| Pesticides - Method 8081 | | | | | | | | | | |
| 4,4'-DDD | mg/kg | 7/10 | 0.0592 | 0.105 | (N) | 0.197 | 0.105 | mg/kg | UCL | (6) |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Aluminum | mg/kg | 51/51 | 14179 | 16584 | (L) | 79300 | 16584 | mg/kg | UCL | (8) |
| Antimony | mg/kg | 23/42 | 24.96 | 80.67 | (L) | 510 | 80.67 | mg/kg | UCL | (8) |
| Arsenic | mg/kg | 50/51 | 7.277 | 9.738 | (L) | 59 | 9.738 | mg/kg | UCL | (8) |
| Cadmium | mg/kg | 25/26 | 11.57 | 20.16 | (G) | 75.3 | 20.16 | mg/kg | UCL | (9) |
| Chromium | mg/kg | 51/51 | 40.84 | 53.14 | (L) | 616 | 53.14 | mg/kg | UCL | (8) |
| Cobalt | mg/kg | 51/51 | 5.049 | 6.555 | (L) | 28 | 6.555 | mg/kg | UCL | (8) |
| Copper | mg/kg | 26/26 | 1213 | 2316 | (G) | 6700 | 2316 | mg/kg | UCL | (9) |
| Iron | mg/kg | 51/51 | 26716 | 56811 | (NP) | 250000 | 56811 | mg/kg | UCL | (7) |
| Lead | mg/kg | 42/42 | 1040 | 4364 | (NP) | 22000 | 1040 | mg/kg | Mean | (5) |
| Manganese | mg/kg | 35/35 | 394.8 | 563.3 | (L) | 1600 | 563.3 | mg/kg | UCL | (8) |
| Mercury | mg/kg | 14/14 | 0.257 | 0.785 | (L) | 1.8 | 0.785 | mg/kg | UCL | (8) |
| Nickel | mg/kg | 9/9 | 60.99 | 3885 | (NP) | 502 | 502 | mg/kg | Max | (4) |
| Silver | mg/kg | 19/26 | 14 | 20.54 | (N) | 84.5 | 20.54 | mg/kg | UCL | (6) |
| Thallium | mg/kg | 14/23 | 0.0679 | 0.0863 | (N) | 0.2 | 0.0863 | mg/kg | UCL | (6) |
| Vanadium | mg/kg | 14/14 | 16.5 | 21.27 | (NP) | 51 | 21.27 | mg/kg | UCL | (7) |
| Zinc | mg/kg | 26/26 | 1112 | 1921 | (G) | 5400 | 1921 | mg/kg | UCL | (9) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Data set too small to calculate meaningful statistics. Therefore, maximum concentration used for exposure point concentration.
(4) UCL exceeds maximum detected concentration. Therefore, maximum concentration used for exposure point concentration.
(5) Probabilistic modeling for lead recommends using the mean concentration.
(6) Goodness-of-Fit test indicates data are normally distributed.
(7) Goodness-of-Fit test indicates data have no discernible distribution.
(8) Goodness-of-Fit test indicates data are lognormally distributed.
(9) Goodness-of-Fit test indicates data are gamma distributed.

Table A3-18
Exposure Point Concentration Summary (Northern/Western AOC, Total Soil)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil |
| Exposure Medium: | Soil |
| Exposure Point: | Soil (0 – 2 ft & > 2 ft) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Aluminum | mg/kg | 8/8 | 9313 | 11515 | (N) | 14300 | 11515 | mg/kg | UCL | (3) |
| Arsenic | mg/kg | 11/11 | 1.919 | 2.495 | (N) | 4.4 | 2.495 | mg/kg | UCL | (3) |
| Chromium | mg/kg | 11/11 | 9.1 | 10.67 | (N) | 12 | 10.67 | mg/kg | UCL | (3) |
| Cobalt | mg/kg | 8/8 | 2.75 | 3.411 | (N) | 4.3 | 3.411 | mg/kg | UCL | (3) |
| Iron | mg/kg | 8/8 | 6889 | 8699 | (N) | 10600 | 8699 | mg/kg | UCL | (3) |
| Thallium | mg/kg | 8/8 | 0.0779 | 0.109 | (N) | 0.18 | 0.109 | mg/kg | UCL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data are normally distributed.

Table A3-19
Exposure Point Concentration Summary (Downgradient Estuarine, Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Arsenic | mg/kg | 19/19 | 10.36 | 12.4 | (N) | 21.3 | 12.4 | mg/kg | UCL | (3) |
| Chromium | mg/kg | 19/19 | 38.66 | 42.58 | (N) | 59 | 42.58 | mg/kg | UCL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
UCL = Upper Confidence Limit
µg/L = microgram per liter

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Goodness-of-Fit test indicates data are normally distributed.

Table A3-20
Exposure Point Concentration Summary (Upgradient Drainage, Sediment)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Sediment |
| Exposure Medium: | Sediment |
| Exposure Point: | Sediment |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Arsenic | mg/kg | 2/2 | -- | -- | -- | 13.3 | 13.3 | mg/kg | Max | (3) |
| Chromium | mg/kg | 2/2 | -- | -- | -- | 27.5 | 27.5 | mg/kg | Max | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
UCL = Upper Confidence Limit
µg/L = microgram per liter

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Data set too small to calculate meaningful statistics. Therefore, maximum concentration used for exposure point concentration.

Table A3-21
Exposure Point Concentration Summary (Surficial Aquifer, Groundwater)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Dioxins/Furans - Method E1613 | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | µg/L | 22/22 | 0.000020595 | 2.0854E-05 | (N) | 0.0000224 | 2.09E-05 | µg/L | UCL | (5) |
| Volatile Organic Compounds (VOCs) - Method SW8260 | | | | | | | | | | |
| Benzene | µg/L | 7/50 | 75.72 | 288.3 | (G) | 2100 | 288.3 | µg/L | UCL | (8) |
| Chloroform | µg/L | 1/50 | -- | -- | -- | 0.72 | 0.72 | µg/L | Max | (3) |
| 1,2-Dichloroethane | µg/L | 4/50 | 0.762 | 1.501 | (N) | 17.6 | 1.501 | µg/L | UCL | (5) |
| cis-1,2-Dichloroethene | µg/L | 8/50 | 4.845 | 8.086 | (N) | 54.5 | 8.086 | µg/L | UCL | (5) |
| Ethylbenzene | µg/L | 15/50 | 157.3 | 356.9 | (NP) | 1300 | 356.9 | µg/L | UCL | (6) |
| Isopropylbenzene | µg/L | 16/50 | 16.99 | 35.41 | (NP) | 91 | 35.41 | µg/L | UCL | (6) |
| Naphthalene | µg/L | 22/51 | 21.35 | 55.56 | (NP) | 120 | 55.56 | µg/L | UCL | (6) |
| Tetrachloroethene | µg/L | 7/50 | 1.659 | 4.2 | (NP) | 14 | 4.2 | µg/L | UCL | (6) |
| Toluene | µg/L | 16/50 | 396.1 | 1087 | (G) | 9800 | 1087 | µg/L | UCL | (8) |
| Trichloroethene | µg/L | 2/50 | 0.384 | 0.913 | (NP) | 3.6 | 0.913 | µg/L | UCL | (7) |
| m,p-Xylene | µg/L | 3/12 | 455.3 | 963.5 | (N) | 2180 | 963.5 | µg/L | UCL | (5) |
| o-Xylene | µg/L | 3/12 | 150.1 | 325.4 | (N) | 859 | 325.4 | µg/L | UCL | (5) |
| Xylene (total) | µg/L | 16/50 | 828.5 | 1186 | (N) | 4800 | 1186 | µg/L | UCL | (5) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | |
| Benzo(a)anthracene | µg/L | 3/51 | 0.14 | 0.157 | (N) | 0.55 | 0.157 | µg/L | UCL | (5) |
| Benzo(a)pyrene | µg/L | 2/51 | 0.0945 | 0.134 | (NP) | 0.34 | 0.134 | µg/L | UCL | (6) |
| Benzo(b)fluoranthene | µg/L | 3/51 | 0.118 | 0.129 | (N) | 0.32 | 0.129 | µg/L | UCL | (5) |
| 1,1'-Biphenyl | µg/L | 14/51 | 1.022 | 1.374 | (N) | 5.5 | 1.374 | µg/L | UCL | (5) |
| Dibenzofuran | µg/L | 7/51 | 0.319 | 0.48 | (G) | 3.6 | 0.48 | µg/L | UCL | (8) |
| 2-Methylnaphthalene | µg/L | 19/51 | 11.68 | 16.67 | (N) | 71 | 16.67 | µg/L | UCL | (5) |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Aluminum | µg/L | 18/51 | 2188 | 6135 | (G) | 55000 | 6135 | µg/L | UCL | (8) |
| Antimony | µg/L | 1/51 | -- | -- | -- | 1 | 1 | µg/L | Max | (3) |
| Arsenic | µg/L | 20/51 | 5.224 | 6.108 | (L) | 71 | 6.108 | µg/L | UCL | (7) |
| Barium | µg/L | 51/51 | 47.61 | 52.91 | (L) | 890 | 52.91 | µg/L | UCL | (7) |
| Beryllium | µg/L | 1/51 | -- | -- | -- | 5.6 | 5.6 | µg/L | Max | (3) |
| Cadmium | µg/L | 5/51 | 0.452 | 0.468 | (L) | 5 | 0.468 | µg/L | UCL | (7) |
| Chromium | µg/L | 19/51 | 3.15 | 6.959 | (NP) | 33 | 6.959 | µg/L | UCL | (6) |
| Cobalt | µg/L | 13/51 | 3.286 | 5.508 | (G) | 42 | 5.508 | µg/L | UCL | (8) |
| Iron | µg/L | 41/51 | 8203 | 13713 | (G) | 100000 | 13713 | µg/L | UCL | (8) |
| Lead | µg/L | 18/51 | 7.204 | 19.22 | (NP) | 140 | 7.204 | µg/L | Mean | (4) |
| Manganese | µg/L | 49/51 | 462.3 | 737.6 | (G) | 4000 | 737.6 | µg/L | UCL | (8) |
| Mercury | µg/L | 11/51 | 0.0595 | 0.0762 | (N) | 0.3 | 0.0762 | µg/L | UCL | (5) |
| Thallium | µg/L | 1/51 | -- | -- | -- | 1.3 | 1.3 | µg/L | Max | (3) |
| Vanadium | µg/L | 13/51 | 4.438 | 7.281 | (G) | 59 | 7.281 | µg/L | UCL | (8) |
| Zinc | µg/L | 30/51 | 84.46 | 48.01 | (L) | 2900 | 48.01 | µg/L | UCL | (7) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
UCL = Upper Confidence Limit
µg/L = microgram per liter

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Data set too small to calculate meaningful statistics. Therefore, maximum concentration used for exposure point concentration.
(4) Probabilistic modeling for lead recommends using the mean concentration.
(5) Goodness-of-Fit test indicates data are normally distributed.

(6) Goodness-of-Fit test indicates data have no discernible distribution.
(7) Goodness-of-Fit test indicates data are lognormally distributed.
(8) Goodness-of-Fit test indicates data are gamma distributed.

Table A3-22
Exposure Point Concentration Summary (Downgradient Estuarine, Surface Water)
Reasonable Maximum Exposure
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Antimony | µg/L | 1/7 | -- | -- | -- | 6.2 | 6.2 | µg/L | Max | (3) |
| Arsenic | µg/L | 7/7 | -- | -- | -- | 11.7 | 11.7 | µg/L | Max | (3) |
| Iron | µg/L | 7/7 | -- | -- | -- | 1030 | 1030 | µg/L | Max | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
UCL = Upper Confidence Limit
µg/L = microgram per liter

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM method.
(3) Data set too small to calculate meaningful statistics. Therefore, maximum concentration used for exposure point concentration.

Table A3-23
Exposure Point Concentration Summary (Vapor Intrusion – Site-Wide; Groundwater, Surficial Aquifer)
Reasonable Maximum Exposure
Remedial Investigation Report
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Indoor Air |
| Exposure Point: | Indoor Air |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1] | 95% UCL (Distribution) [1] | | Maximum Concentration | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Value | Units | Statistic | Rationale |
| Volatile Organic Compounds (VOCs) - Method SW8260 (Residential Exposure) | | | | | | | | | | |
| 1,2-Dichloroethane | µg/L | 4/50 | 0.762 | 1.501 | (N) | 17.6 | 0.849 | µg/m$^3$ | Max | (2) |
| Benzene | µg/L | 7/50 | 75.72 | 288.3 | (G) | 2100 | 476 | µg/m$^3$ | Max | (2) |
| Cyclohexane | µg/L | 13/50 | 77.01 | 111.8 | (N) | 490 | 3000 | µg/m$^3$ | Max | (2) |
| Ethylbenzene | µg/L | 15/50 | 157.3 | 356.9 | (NP) | 1300 | 419 | µg/m$^3$ | Max | (2) |
| Isopropylbenzene | µg/L | 16/50 | 16.99 | 35.41 | (NP) | 91 | 42.8 | µg/m$^3$ | Max | (2) |
| Naphthalene | µg/L | 22/51 | 21.35 | 55.56 | (NP) | 120 | 2.16 | µg/m$^3$ | Max | (2) |
| Methylcyclohexane | µg/L | 17/50 | 51.93 | 75.89 | (N) | 440 | -- | µg/m$^4$ | Max | (3) |
| Tetrachloroethene | µg/L | 7/50 | 1.659 | 4.2 | (NP) | 14 | 10.1 | µg/m$^3$ | Max | (2) |
| Toluene | µg/L | 16/50 | 396.1 | 1087 | (G) | 9800 | 2660 | µg/m$^3$ | Max | (2) |
| Trichloroethene | µg/L | 2/50 | 0.384 | 0.913 | (NP) | 3.6 | 1.45 | µg/m$^3$ | Max | (2) |
| Xylene (total) | µg/L | 16/50 | 828.5 | 1186 | (N) | 4800 | 1300 | µg/m$^3$ | Max | (2) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | |
| 1,1'-biphenyl | µg/L | 14/51 | 1.022 | 1.374 | (N) | 5.5 | 0.0693 | µg/m$^3$ | Max | (2) |
| Metals - Methods SW6020/7471 | | | | | | | | | | |
| Mercury | µg/L | 11/51 | 0.0983 | 0.13 | (N) | 0.3 | 0.106 | µg/m$^3$ | Max | (2) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
KM = Kaplan Meier
UCL = Upper Confidence Limit
µg/L = microgram per liter
µg/m$^3$ = microgram per cubic meter
USEPA = United States Environmental Protection Agency

Distribution Key:
Normal (N)
Gamma (G)
Lognormal (L)
Non-Parametric (NP)

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) The maximum concentration was used to estimate an indoor air concentration using the USEPA Vapor Intrusion Screening Level (VISL) Calculator (see Attachment A4).
(3) Indoor air concentration could not be calculated because there was no inhalation toxicity information.

Table A3-24
Exposure Point Concentration Summary (Multiple Areas, Total Soil & Sediment)
Reasonable Maximum Exposure (Data Sensitivity Analysis)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Soil & Sediment |
| Exposure Medium: | Soil & Sediment |
| Exposure Point: | Total Soil & Sediment |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Detection Limit | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Value | Units | Statistic | Rationale |
| Central/Southern AOC, Total Soil, Metals - Methods SW6020/7471 | | | | | | | | | | | |
| Thallium | mg/kg | 1/28 | -- | -- | -- | 0.034 | 1.8 | 0.9 | mg/kg | 1/2 MDL | (3) |
| Northern/Western AOC, Total Soil, Metals - Methods SW6020/7471 | | | | | | | | | | | |
| Thallium | mg/kg | 0/3 | -- | -- | -- | All ND | 1.4 | 0.7 | mg/kg | 1/2 MDL | (3) |
| Downgradient Estuarine, Sediment, Metals - Methods SW6020/7471 | | | | | | | | | | | |
| Thallium | mg/kg | 8/19 | 0.243 | 0.314 | (N) | 0.5 | 4.6 | 2.3 | mg/kg | 1/2 MDL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
ND = Non-Detect
MDL = Method Detection Limit
mg/kg = milligram per kilogram

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM (Kaplan Meier) method.
(3) Only detection limits exceeded screening levels. Therefore, 1/2 the MDL was used for exposure point concentrations within Data Sensitivity Analysis.

Table A3-25
Exposure Point Concentration Summary (Surficial Aquifer, Groundwater)
Reasonable Maximum Exposure (Data Sensitivity Analysis)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Detection Limit | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Value | Units | Statistic | Rationale |
| Volatile Organic Compounds (VOCs) - Method SW8260 | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | µg/L | 0/50 | -- | -- | -- | All ND | 8 | 4 | µg/L | 1/2 MDL | (3) |
| 1,1,2-Trichloroethane | µg/L | 0/50 | -- | -- | -- | All ND | 4.9 | 2.45 | µg/L | 1/2 MDL | (3) |
| 1,1-Dichloroethane | µg/L | 0/50 | -- | -- | -- | All ND | 2.3 | 1.15 | µg/L | 1/2 MDL | (3) |
| 1,1-Dichloroethene | µg/L | 0/50 | -- | -- | -- | All ND | 3.3 | 1.65 | µg/L | 1/2 MDL | (3) |
| 1,2,4-Trichlorobenzene | µg/L | 0/50 | -- | -- | -- | All ND | 4.1 | 2.05 | µg/L | 1/2 MDL | (3) |
| 1,2-Dibromo-3-chloropropane | µg/L | 0/50 | -- | -- | -- | All ND | 11 | 5.5 | µg/L | 1/2 MDL | (3) |
| 1,2-Dibromoethane | µg/L | 0/50 | -- | -- | -- | All ND | 5.2 | 2.6 | µg/L | 1/2 MDL | (3) |
| 1,2-Dichlorobenzene | µg/L | 0/50 | -- | -- | -- | All ND | 2 | 1 | µg/L | 1/2 MDL | (3) |
| 1,2-Dichloropropane | µg/L | 0/50 | -- | -- | -- | All ND | 2.4 | 1.2 | µg/L | 1/2 MDL | (3) |
| 1,3-Dichlorobenzene | µg/L | 0/50 | -- | -- | -- | All ND | 3.2 | 1.6 | µg/L | 1/2 MDL | (3) |
| 1,4-Dichlorobenzene | µg/L | 0/50 | -- | -- | -- | All ND | 2.4 | 1.2 | µg/L | 1/2 MDL | (3) |
| 2-Hexanone | µg/L | 0/50 | -- | -- | -- | All ND | 13 | 6.5 | µg/L | 1/2 MDL | (3) |
| Bromodichloromethane | µg/L | 0/50 | -- | -- | -- | All ND | 1.7 | 0.85 | µg/L | 1/2 MDL | (3) |
| Bromoform | µg/L | 0/50 | -- | -- | -- | All ND | 5.4 | 2.7 | µg/L | 1/2 MDL | (3) |
| Bromomethane | µg/L | 0/50 | -- | -- | -- | All ND | 3.8 | 1.9 | µg/L | 1/2 MDL | (3) |
| Carbon tetrachloride | µg/L | 0/50 | -- | -- | -- | All ND | 2.9 | 1.45 | µg/L | 1/2 MDL | (3) |
| Chlorobenzene | µg/L | 0/50 | -- | -- | -- | All ND | 2.2 | 1.1 | µg/L | 1/2 MDL | (3) |
| Chloromethane | µg/L | 0/50 | -- | -- | -- | All ND | 3.5 | 1.75 | µg/L | 1/2 MDL | (3) |
| cis-1,3-Dichloropropene | µg/L | 0/50 | -- | -- | -- | All ND | 1.5 | 0.75 | µg/L | 1/2 MDL | (3) |
| Dibromochloromethane | µg/L | 0/50 | -- | -- | -- | All ND | 2.8 | 1.4 | µg/L | 1/2 MDL | (3) |
| Dichlorodifluoromethane | µg/L | 0/50 | -- | -- | -- | All ND | 10 | 5 | µg/L | 1/2 MDL | (3) |
| Hexachlorobutadiene | µg/L | 0/51 | -- | -- | -- | All ND | 0.44 | 0.22 | µg/L | 1/2 MDL | (3) |
| Methyl Tert Butyl Ether | µg/L | 0/50 | -- | -- | -- | All ND | 3.1 | 1.55 | µg/L | 1/2 MDL | (3) |
| Methylene chloride | µg/L | 0/50 | -- | -- | -- | All ND | 2.7 | 1.35 | µg/L | 1/2 MDL | (3) |
| trans-1,2-Dichloroethene | µg/L | 0/50 | -- | -- | -- | All ND | 4.2 | 2.1 | µg/L | 1/2 MDL | (3) |
| trans-1,3-Dichloropropene | µg/L | 0/50 | -- | -- | -- | All ND | 2 | 1 | µg/L | 1/2 MDL | (3) |
| Vinyl chloride | µg/L | 0/50 | -- | -- | -- | All ND | 2.9 | 1.45 | µg/L | 1/2 MDL | (3) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | | |
| 2,4,6-Trichlorophenol | µg/L | 0/51 | -- | -- | -- | All ND | 1.4 | 0.7 | µg/L | 1/2 MDL | (3) |
| 2,4-Dinitrophenol | µg/L | 0/51 | -- | -- | -- | All ND | 3.6 | 1.8 | µg/L | 1/2 MDL | (3) |
| 2,4-Dinitrotoluene | µg/L | 0/51 | -- | -- | -- | All ND | 1.1 | 0.55 | µg/L | 1/2 MDL | (3) |
| 2,6-Dinitrotoluene | µg/L | 0/51 | -- | -- | -- | All ND | 1.1 | 0.55 | µg/L | 1/2 MDL | (3) |
| 2-Nitrophenol | µg/L | 0/51 | -- | -- | -- | All ND | 2 | 1 | µg/L | 1/2 MDL | (3) |
| 3,3'-Dichlorobenzidine | µg/L | 0/48 | -- | -- | -- | All ND | 2.2 | 1.1 | µg/L | 1/2 MDL | (3) |
| 4,6-Dinitro-o-cresol | µg/L | 0/51 | -- | -- | -- | All ND | 4.5 | 2.25 | µg/L | 1/2 MDL | (3) |
| 4-Chloroaniline | µg/L | 0/51 | -- | -- | -- | All ND | 0.44 | 0.22 | µg/L | 1/2 MDL | (3) |
| 4-Nitroaniline | µg/L | 0/51 | -- | -- | -- | All ND | 1.8 | 0.9 | µg/L | 1/2 MDL | (3) |
| 4-Nitrophenol | µg/L | 0/51 | -- | -- | -- | All ND | 2.2 | 1.1 | µg/L | 1/2 MDL | (3) |
| Atrazine | µg/L | 0/51 | -- | -- | -- | All ND | 0.44 | 0.22 | µg/L | 1/2 MDL | (3) |
| Bis(2-chloroethyl)ether | µg/L | 0/51 | -- | -- | -- | All ND | 0.67 | 0.335 | µg/L | 1/2 MDL | (3) |
| bis(2-Ethylhexyl)phthalate | µg/L | 0/51 | -- | -- | -- | All ND | 4.5 | 2.25 | µg/L | 1/2 MDL | (3) |
| Butyl benzyl phthalate | µg/L | 0/51 | -- | -- | -- | All ND | 4.5 | 2.25 | µg/L | 1/2 MDL | (3) |
| Dibenzo(a,h)anthracene | µg/L | 0/51 | -- | -- | -- | All ND | 0.59 | 0.295 | µg/L | 1/2 MDL | (3) |
| Hexachlorobenzene | µg/L | 0/51 | -- | -- | -- | All ND | 0.88 | 0.44 | µg/L | 1/2 MDL | (3) |
| Hexachlorocyclopentadiene | µg/L | 0/51 | -- | -- | -- | All ND | 3.6 | 1.8 | µg/L | 1/2 MDL | (3) |
| Hexachloroethane | µg/L | 0/51 | -- | -- | -- | All ND | 0.44 | 0.22 | µg/L | 1/2 MDL | (3) |
| Indeno(1,2,3-cd)pyrene | µg/L | 1/51 | -- | -- | -- | All ND | 0.79 | 0.395 | µg/L | 1/2 MDL | (3) |
| Nitrobenzene | µg/L | 0/51 | -- | -- | -- | All ND | 0.71 | 0.355 | µg/L | 1/2 MDL | (3) |
| N-Nitroso-di-n-propylamine | µg/L | 0/51 | -- | -- | -- | All ND | 0.88 | 0.44 | µg/L | 1/2 MDL | (3) |
| Pentachlorophenol | µg/L | 0/51 | -- | -- | -- | All ND | 2.1 | 1.05 | µg/L | 1/2 MDL | (3) |
| Pesticides - Method 8081 | | | | | | | | | | | |
| Aldrin | µg/L | 0/12 | -- | -- | -- | All ND | 0.0037 | 0.00185 | µg/L | 1/2 MDL | (3) |
| Polychlorinated Biphenyls - Method 8082 | | | | | | | | | | | |
| Aroclor 1221 | µg/L | 0/12 | -- | -- | -- | All ND | 0.52 | 0.26 | µg/L | 1/2 MDL | (3) |
| Aroclor 1232 | µg/L | 0/12 | -- | -- | -- | All ND | 0.43 | 0.215 | µg/L | 1/2 MDL | (3) |
| Aroclor 1242 | µg/L | 0/12 | -- | -- | -- | All ND | 0.18 | 0.09 | µg/L | 1/2 MDL | (3) |
| Aroclor 1248 | µg/L | 0/12 | -- | -- | -- | All ND | 0.17 | 0.085 | µg/L | 1/2 MDL | (3) |
| Aroclor 1254 | µg/L | 0/12 | -- | -- | -- | All ND | 0.12 | 0.06 | µg/L | 1/2 MDL | (3) |

Table A3-25
Exposure Point Concentration Summary (Surficial Aquifer, Groundwater)
Reasonable Maximum Exposure (Data Sensitivity Analysis)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Surficial Aquifer) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Detection Limit | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Value | Units | Statistic | Rationale |
| Aroclor 1260 | µg/L | 0/12 | -- | -- | -- | All ND | 0.13 | 0.065 | µg/L | 1/2 MDL | (3) |
| Cyanide - Method 9010 | | | | | | | | | | | |
| Cyanide | µg/L | 0/12 | -- | -- | -- | All ND | 10 | 5 | µg/L | 1/2 MDL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
ND = Non-Detect
MDL = Method Detection Limit
mg/kg = milligram per kilogram

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM (Kaplan Meier) method.
(3) Only detection limits exceeded screening levels. Therefore, 1/2 the MDL was used for exposure point concentrations within Data Sensitivity Analysis.

Table A3-26
Exposure Point Concentration Summary (Yorktown Aquifer, Groundwater)
Reasonable Maximum Exposure (Data Sensitivity Analysis)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Groundwater |
| Exposure Medium: | Groundwater |
| Exposure Point: | Groundwater (Yorktown Aquifer) |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Detection Limit | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Value | Units | Statistic | Rationale |
| Dioxins/Furans - Method E1613 | | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | µg/L | 0/0 | -- | -- | -- | All ND | 0.00002 | 0.00001 | µg/L | 1/2 MDL | (3) |
| Volatile Organic Compounds (VOCs) - Method SW8260 | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| 1,1,2-Trichloroethane | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| 1,2-Dibromo-3-chloropropane | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| 1,2-Dibromoethane | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| 1,2-Dichloroethane | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Bromodichloromethane | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Chloroform | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Hexachlorobutadiene | µg/L | 0/3 | -- | -- | -- | All ND | 0.4 | 0.2 | µg/L | 1/2 MDL | (3) |
| Trichloroethene | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Vinyl chloride | µg/L | 0/2 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | | |
| 1,1'-Biphenyl | µg/L | 0/3 | -- | -- | -- | All ND | 0.4 | 0.2 | µg/L | 1/2 MDL | (3) |
| 2,4-Dinitrotoluene | µg/L | 0/3 | -- | -- | -- | All ND | 1 | 0.5 | µg/L | 1/2 MDL | (3) |
| 2,6-Dinitrotoluene | µg/L | 0/3 | -- | -- | -- | All ND | 1 | 0.5 | µg/L | 1/2 MDL | (3) |
| 3,3'-Dichlorobenzidine | µg/L | 0/3 | -- | -- | -- | All ND | 2 | 1 | µg/L | 1/2 MDL | (3) |
| 4,6-Dinitro-o-cresol | µg/L | 0/3 | -- | -- | -- | All ND | 4 | 2 | µg/L | 1/2 MDL | (3) |
| Benzo(a)anthracene | µg/L | 0/3 | -- | -- | -- | All ND | 0.16 | 0.08 | µg/L | 1/2 MDL | (3) |
| Benzo(a)pyrene | µg/L | 0/3 | -- | -- | -- | All ND | 0.16 | 0.08 | µg/L | 1/2 MDL | (3) |
| Bis(2-chloroethyl)ether | µg/L | 0/3 | -- | -- | -- | All ND | 0.4 | 0.2 | µg/L | 1/2 MDL | (3) |
| Dibenzo(a,h)anthracene | µg/L | 0/3 | -- | -- | -- | All ND | 0.16 | 0.08 | µg/L | 1/2 MDL | (3) |
| Hexachlorobenzene | µg/L | 0/3 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Hexachlorocyclopentadiene | µg/L | 0/3 | -- | -- | -- | All ND | 3.2 | 1.6 | µg/L | 1/2 MDL | (3) |
| Nitrobenzene | µg/L | 0/3 | -- | -- | -- | All ND | 0.4 | 0.2 | µg/L | 1/2 MDL | (3) |
| N-Nitroso-di-n-propylamine | µg/L | 0/3 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| Pentachlorophenol | µg/L | 0/3 | -- | -- | -- | All ND | 1.5 | 0.75 | µg/L | 1/2 MDL | (3) |
| Metals - Methods SW6020/7471 | | | | | | | | | | | |
| Antimony | µg/L | 0/3 | -- | -- | -- | All ND | 15 | 7.5 | µg/L | 1/2 MDL | (3) |
| Arsenic | µg/L | 0/3 | -- | -- | -- | All ND | 8 | 4 | µg/L | 1/2 MDL | (3) |
| Cadmium | µg/L | 0/3 | -- | -- | -- | All ND | 2.5 | 1.25 | µg/L | 1/2 MDL | (3) |
| Chromium | µg/L | 0/3 | -- | -- | -- | All ND | 5 | 2.5 | µg/L | 1/2 MDL | (3) |
| Cobalt | µg/L | 0/3 | -- | -- | -- | All ND | 13 | 6.5 | µg/L | 1/2 MDL | (3) |
| Thallium | µg/L | 0/3 | -- | -- | -- | All ND | 25 | 12.5 | µg/L | 1/2 MDL | (3) |
| Vanadium | µg/L | 0/3 | -- | -- | -- | All ND | 25 | 12.5 | µg/L | 1/2 MDL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
ND = Non-Detect
MDL = Method Detection Limit
mg/kg = milligram per kilogram

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM (Kaplan Meier) method.
(3) Only detection limits exceeded screening levels. Therefore, 1/2 the MDL was used for exposure point concentrations within Data Sensitivity Analysis.

Table A3-27
Exposure Point Concentration Summary (Downgradient Estuarine, Surface Water)
Reasonable Maximum Exposure (Data Sensitivity Analysis)
Human Health Risk Assessment
Construction Debris Landfill, Wallops Island, Virginia

| | |
|---|---|
| Scenario Timeframe: | Current and Future |
| Medium: | Surface Water |
| Exposure Medium: | Surface Water |
| Exposure Point: | Surface Water |

| COPC | Units | Detection Frequency [1] | Arithmetic Mean [1,2] | 95% UCL (Distribution) [1] | | Maximum Concentration | Detection Limit | Exposure Point Concentration | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Value | Units | Statistic | Rationale |
| Volatile Organic Compounds (VOCs) - Method SW8260 | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | µg/L | 0/7 | -- | -- | -- | All ND | 0.8 | 0.4 | µg/L | 1/2 MDL | (3) |
| 1,2,4-Trichlorobenzene | µg/L | 0/7 | -- | -- | -- | All ND | 0.41 | 0.205 | µg/L | 1/2 MDL | (3) |
| 1,2-Dibromo-3-chloropropane | µg/L | 0/7 | -- | -- | -- | All ND | 1.1 | 0.55 | µg/L | 1/2 MDL | (3) |
| 1,2-Dibromoethane | µg/L | 0/7 | -- | -- | -- | All ND | 0.52 | 0.26 | µg/L | 1/2 MDL | (3) |
| Hexachlorobutadiene | µg/L | 0/7 | -- | -- | -- | All ND | 0.21 | 0.105 | µg/L | 1/2 MDL | (3) |
| Vinyl chloride | µg/L | 0/7 | -- | -- | -- | All ND | 0.29 | 0.145 | µg/L | 1/2 MDL | (3) |
| Semi-Volatile Organic Compounds (SVOCs) - Method SW8270 | | | | | | | | | | | |
| 2,4-Dinitrotoluene | µg/L | 0/7 | -- | -- | -- | All ND | 1 | 0.5 | µg/L | 1/2 MDL | (3) |
| 3,3'-Dichlorobenzidine | µg/L | 0/7 | -- | -- | -- | All ND | 1.4 | 0.7 | µg/L | 1/2 MDL | (3) |
| Benzo(a)anthracene | µg/L | 0/7 | -- | -- | -- | All ND | 0.42 | 0.21 | µg/L | 1/2 MDL | (3) |
| Benzo(a)pyrene | µg/L | 0/7 | -- | -- | -- | All ND | 0.85 | 0.425 | µg/L | 1/2 MDL | (3) |
| Benzo(b)fluoranthene | µg/L | 0/7 | -- | -- | -- | All ND | 0.82 | 0.41 | µg/L | 1/2 MDL | (3) |
| Benzo(k)fluoranthene | µg/L | 0/7 | -- | -- | -- | All ND | 0.74 | 0.37 | µg/L | 1/2 MDL | (3) |
| Bis(2-chloroethyl)ether | µg/L | 0/7 | -- | -- | -- | All ND | 0.74 | 0.37 | µg/L | 1/2 MDL | (3) |
| Bis(2-ethylhexyl)phthalate | µg/L | 0/7 | -- | -- | -- | All ND | 0.96 | 0.48 | µg/L | 1/2 MDL | (3) |
| Butyl benzyl phthalate | µg/L | 0/7 | -- | -- | -- | All ND | 0.7 | 0.35 | µg/L | 1/2 MDL | (3) |
| Chrysene | µg/L | 0/7 | -- | -- | -- | All ND | 0.49 | 0.245 | µg/L | 1/2 MDL | (3) |
| Dibenzo(a,h)anthracene | µg/L | 0/7 | -- | -- | -- | All ND | 0.64 | 0.32 | µg/L | 1/2 MDL | (3) |
| Hexachlorobenzene | µg/L | 0/7 | -- | -- | -- | All ND | 0.63 | 0.315 | µg/L | 1/2 MDL | (3) |
| Hexachloroethane | µg/L | 0/7 | -- | -- | -- | All ND | 0.33 | 0.165 | µg/L | 1/2 MDL | (3) |
| Indeno(1,2,3-cd)pyrene | µg/L | 0/7 | -- | -- | -- | All ND | 0.87 | 0.435 | µg/L | 1/2 MDL | (3) |
| N-Nitroso-di-n-propylamine | µg/L | 0/7 | -- | -- | -- | All ND | 0.55 | 0.275 | µg/L | 1/2 MDL | (3) |
| Pentachlorophenol | µg/L | 0/7 | -- | -- | -- | All ND | 2.2 | 1.1 | µg/L | 1/2 MDL | (3) |
| Pesticides - Method 8081 | | | | | | | | | | | |
| 4,4'-DDD | µg/L | 0/7 | -- | -- | -- | All ND | 0.0028 | 0.0014 | µg/L | 1/2 MDL | (3) |
| 4,4'-DDE | µg/L | 0/7 | -- | -- | -- | All ND | 0.0019 | 0.00095 | µg/L | 1/2 MDL | (3) |
| 4,4'-DDT | µg/L | 0/7 | -- | -- | -- | All ND | 0.0057 | 0.00285 | µg/L | 1/2 MDL | (3) |
| Aldrin | µg/L | 0/7 | -- | -- | -- | All ND | 0.0039 | 0.00195 | µg/L | 1/2 MDL | (3) |
| alpha-BHC | µg/L | 0/7 | -- | -- | -- | All ND | 0.003 | 0.0015 | µg/L | 1/2 MDL | (3) |
| Dieldrin | µg/L | 0/7 | -- | -- | -- | All ND | 0.002 | 0.001 | µg/L | 1/2 MDL | (3) |
| Heptachlor | µg/L | 0/7 | -- | -- | -- | All ND | 0.003 | 0.0015 | µg/L | 1/2 MDL | (3) |
| Heptachlor epoxide | µg/L | 0/7 | -- | -- | -- | All ND | 0.0017 | 0.00085 | µg/L | 1/2 MDL | (3) |
| Toxaphene | µg/L | 0/7 | -- | -- | -- | All ND | 0.11 | 0.055 | µg/L | 1/2 MDL | (3) |
| Cyanide - Method 9010 | | | | | | | | | | | |
| Cyanide | µg/L | 0/7 | -- | -- | -- | All ND | 10000 | 5000 | µg/L | 1/2 MDL | (3) |
| Metals - Methods SW6020/7471 | | | | | | | | | | | |
| Thallium | µg/L | 0/7 | -- | -- | -- | All ND | 2.4 | 1.2 | µg/L | 1/2 MDL | (3) |

Notes:
-- = Not Evaluated
COPC = Chemical of Potential Concern
ft = feet
ND = Non-Detect
MDL = Method Detection Limit
mg/kg = milligram per kilogram

(1) A minimum of five (5) samples with two (2) distinct detects are needed to calculate summary statistics and UCLs but may not be adequate to compute meaningful and reliable results. Therefore, summary statistics and UCLs are only shown if total samples are eight (8) or more.
(2) If the dataset contains nondetects, summary statistics and UCLs are estimated by the KM (Kaplan Meier) method.
(3) Only detection limits exceeded screening levels. Therefore, 1/2 the MDL was used for exposure point concentrations within Data Sensitivity Analysis.

# Attachment 4

## Environmental Transport and Fate Models

Table A4-1
Site-Specific Particulate Emission Factor
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

Environmental Transport and Fate Models

Air Modeling for Generation of Dust from Soil
Non-Construction Scenario

1) General Form for Calculating Receptor and Pathway-Specific Dispersion Factors (Q/C) (USEPA, 2002)

$$Q/C_{wind} = A * \exp[ (\ln A_{site} - B)^2 / C ]$$

| Values | Parameter | Parameter Description |
|---|---|---|
| 16.2302 | A | Constant for Minneapolis, MN; Climate Zone 5 (unitless) |
| 18.7762 | B | Constant for Minneapolis, MN; Climate Zone 5 (unitless) |
| 216.108 | C | Constant for Minneapolis, MN; Climate Zone 5 (unitless) |
| 0.5 | $A_{site}$ | Areal extent of the site or contamination (acres) (1) |
| 93.77 | $Q/C_{wind}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) |

2) Derivation of the Particulate Emission Factor (PEF)

$$PEF = \frac{Q/C_{wind} * 3{,}600 s/h}{0.036 * (1-V) * (U_m/U_t)^3 * F(x)}$$

| Values | Parameter | Parameter Description |
|---|---|---|
| 93.77 | $Q/C_{wind}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) |
| 0.5 | V | Fraction of vegetative cover (unitless) |
| 4.69 | Um | Mean annual wind speed (m/s) (USEPA, 2002) |
| 11.32 | Ut | Equivalent threshold value of wind speed at 7m (m/s) |
| 0.194 | F(x) | Function dependent on Um/Ut derived from Cowherd et al. 1985 (unitless) |
| 1.36E+09 | PEF | Particulate emission factor ($m^3/kg$) |

Notes:
(1) Selected to represent most conservative scenario allowed by the model (0.5 acres).
References:
USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.

Table A4-2
Site-Specific Particulate Emission Factor from Generation of Dust from Soil from Unpaved Roads (Construction Scenario)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

Environmental Transport and Fate Models

Air Modeling for Generation of Dust from Soil
Construction Scenario

1) General Form for Calculating Construction Worker Dispersion Factor (Q/Csr) (USEPA, 2002)

$$Q/C_{sr} = A \times \exp[ (\ln A_{site} - B)^2 / C ]$$

| Values | Parameters | Parameter Description |
|---|---|---|
| 12.9351 | A | Constant (unitless) |
| 5.7383 | B | Constant (unitless) |
| 71.7711 | C | Constant (unitless) |
| 0.5 | $A_{site}$ | Areal extent of the site or contamination (acres) |
| 23.02 | $Q/C_{sr}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) |

2) Calculation of Site-Specific Dispersion Correction Factor ($F_D$) (USEPA, 2002)

$$F_D = 0.1852 + (5.3537 \times 1/t_c) + (-9.6318 \times 1/t_c^2)$$

| Values | Parameters | Parameter Description |
|---|---|---|
| 6000 | $t_c$ | Duration of construction (hr) |
| 0.1861 | $F_D$ | Dispersion correction factor (unitless) |

3) Derivation of the Particulate Emission Factor Construction Scenario (USEPA, 2002)

$$PEF_{sc} = Q/C_{sr} \times 1/F_D \times \frac{T \times A_R}{556 \times (W / 3)^{0.4} \times [ (365 \text{ days/year} - p) / 365 \text{ days/year} ] \times [\text{SUM (VKT)}]}$$

| Values | Parameters | Parameter Description |
|---|---|---|
| calc, site specific | $PEF_{sc}$ | Subchronic road particulate emission factor ($m^3/kg$) |
| site specific | $Q/C_{sr}$ | Inverse of 1-h average air concentration along a straight road segment bisecting a 0.5-acre square site ($g/m^2$-s per $kg/m^3$) |
| 0.1861 | $F_D$ | Dispersion correction factor (unitless) |
| 21600000 | T | Total time over which construction occurs (s) |
| 274 | $A_R$ | Surface area of contaminated road segment ($m^2$), Equation: LR × WR × 0.092903 $m^2/ft^2$ |
| 148 | $L_R$ | Length of road segment (ft) |
| 20 | $W_R$ | Width of road segment (ft) |
| 4.7 | W | Mean vehicle weight (tons) |
| 140 | p | Number of days with at least 0.01 inches of precipitation (days/year) (Exhibit 5-2; USEPA, 2002) |
| 1.69E+02 | SUM (VKT) | Sum of fleet vehicle kilometers traveled during the exposure duration (km) |

Site-Specific Assumptions for Construction Site:

| Values | Parameters | Parameter Description |
|---|---|---|
| T = | 21600000 | Assume 6-month construction project working (5 days/week x 50 weeks/year x 1 year) |
| $A_R$ = | 274 | Assume standard road width of 6.09 m |
| W = | 4.7 | Assume 10 two-ton cars + 2 ten-ton trucks + 1 ten-ton backhoe + 1 ten-ton bulldozer + 1 ten-ton excavator |
| SUM (VKT) = | 1.69E+02 | Assume travel length of road once per day, for length of project, where: = No of fleet vehicles x length of road (km/day) x construction period (days) |
| $PEF_{sc}$ | 1.06E+07 | Subchronic road particulate emission factor ($m^3/kg$) |

References:
USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.

Table A4-3
Calculation of the Site-Specific Volatilization Factors
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

Environmental Transport and Fate Models

Dispersion Factor for Chronic Volatile Emissions ($Q/C_{vol}$)
Non-Construction Scenario (Open Air)

$$Q/C_{wind} = A * \exp[ (\ln A_{site} - B)^2 / C ]$$

| Values | Parameter | Parameter Description |
|---|---|---|
| 16.2302 | A | Constant for Minneapolis, MN; Climate Zone 5 (unitless) |
| 18.7762 | B | Constant for Minneapolis, MN; Climate Zone 5 (unitless) |
| 216.108 | C | Constant for Minneapolis, MN; Climate Zone 5 (unitless) |
| 0.5 | $A_{site}$ | Areal extent of the site or contamination (acres)(1) |
| 93.77 | $Q/C_{vol}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) |

Dispersion Factor for Subchronic Volatile Emissions ($Q/C_{sa}$)
Construction Scenario (Trench Air)

$$Q/C_{sa} = A * \exp[ (\ln A_{site} - B)^2 / C ]$$

| Values | Parameter | Parameter Description |
|---|---|---|
| 2.4538 | A | Constant (unitless) |
| 17.566 | B | Constant (unitless) |
| 189.0426 | C | Constant (unitless) |
| 0.5 | $A_{site}$ | Areal extent of the site or contamination (acres) |
| 14.31 | $Q/C_{sa}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) |

Notes:
(1) Selected to represent most conservative scenario allowed by the model (0.5 acres).
References:
USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.

Table A4-4
Derivation of the Soil Saturation Concentrations
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| Soil Chemical of Potential Concern | CASRN | Solubility Limit (mg/L) | $K_{oc}$ (L/kg) | $K_d$ (L/kg) | H' (unitless) | Csat (mg/kg) | Physical State at Average Soil Temp |
|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | |
| 1,1,2-Trichloroethane | 79-00-5 | 4.59E+03 | 6.07E+01 | 3.64E-01 | 3.37E-02 | 2.16E+03 | Liquid |
| 2-Hexanone | 591-78-6 | 1.72E+04 | 1.50E+01 | 8.99E-02 | 3.81E-03 | 3.28E+03 | Liquid |
| Benzene | 71-43-2 | 1.79E+03 | 1.46E+02 | 8.75E-01 | 2.27E-01 | 1.82E+03 | Liquid |
| Ethylbenzene | 100-41-4 | 1.69E+02 | 4.46E+02 | 2.68E+00 | 3.22E-01 | 4.80E+02 | Liquid |
| Naphthalene | 91-20-3 | 3.10E+01 | 1.54E+03 | 9.26E+00 | 1.80E-02 | 2.90E+02 | Solid |
| Xylenes, Total | 1330-20-7 | 1.06E+02 | 3.83E+02 | 2.30E+00 | 2.71E-01 | 2.60E+02 | Liquid |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | |
| Benzo(a)anthracene | 56-55-3 | 9.40E-03 | 1.77E+05 | 1.06E+03 | 4.91E-04 | 9.98E+00 | Solid |
| Dioxins/Furans | | | | | | | |
| 2,3,7,8-TCDD TEQ | 2,3,7,8-TCDD TEQ | 2.00E-04 | 2.49E+05 | 1.49E+03 | 2.04E-03 | 2.99E-01 | Solid |
| Metals (Total) | | | | | | | |
| Mercury | 7439-97-6 | 6.90E+04 | -- | 5.20E+01 | 3.52E-01 | 3.60E+06 | Solid |

Notes:
-- = Not Evaluated; only volatile chemicals evaluated
CASRN = Chemical Abstract Services Registry Number

Derivation of the Soil Saturation ($C_{sat}$)

$$C_{sat} = \frac{S}{\rho_b} \times (K_d \rho_b + \theta_w + H' \theta_a)$$

| Equation Parameter/Definitions (units) | Value | Default |
|---|---|---|
| $C_{sat}$ /soil saturation concentration (mg/kg) | Calculated | Calculated |
| S /solubility in water (mg/L – water) | See below | Constituent-specific |
| $\rho_b$ /dry soil bulk density (kg/L) | 1.5 | 1.5[a] |
| $K_d$ /soil-water partition coefficient (L/kg) | See below | Organics: $K_d = K_{oc} \times f_{oc}$ |
| | | Inorganics: Constituent-specific[b] |
| Koc /soil organic carbon partition coefficient (L/kg) | See below | Constituent-specific |
| $F_{oc}$ /fraction organic carbon in soil (g/g) | 0.006 | 0.006 (0.6%)[a] |
| $\theta_w$ /water-filled soil porosity ($L_{water}/L_{soil}$) | 0.15 | 0.15[a] |
| H' /dimensionless Henry's law constant | See below | Constituent-specific |
| $\theta_a$ /air-filled soil porosity ($L_{air}/L_{soil}$) | 0.28 | 0.28 or n-$\theta_w$ |
| n /total soil porosity ($L_{pore}/L_{soil}$) | 0.43 | 1 – ($\rho_b/\rho_s$) |
| $\rho_s$ /soil particle density (g/cm$^3$) | 2.65 | 2.65[a] |

[a] Site-specific value may be substituted if data are available.
[b] Assuming a pH of 6.8 when selecting default $K_d$ values for metals.
[c] USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, OSWER 9355.4-24. December 2002.

Table A4-5
Henry's Law Constant at System Temperature
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| Soil and/or Groundwater Volatile Chemical of Potential Concern (Non-Vapor Intrusion) | CASRN | $T_C$ (°K) | $T_B$ (°K) | $T_B/T_C$ | n | $\Delta H_{v,b}$ (cal/mol) | $\Delta H_{v,TS}$ (cal/mol) | $H_R$ (atm-$m^3$/mol) | $T_r$ (°K) | $H'_{TS}$ | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 6.61E+02 | 4.20E+02 | 6.35E-01 | 3.54E-01 | 9.00E+03 | 1.05E+04 | 3.44E-04 | 2.98E+02 | 8.42E-03 | USEPA, 2001 |
| 1,1,2-Trichloroethane | 79-00-5 | 6.02E+02 | 3.86E+02 | 6.41E-01 | 3.59E-01 | 8.32E+03 | 9.51E+03 | 9.12E-04 | 2.98E+02 | 2.35E-02 | USEPA, 2001 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 7.25E+02 | 4.86E+02 | 6.71E-01 | 3.80E-01 | 1.05E+04 | 1.32E+04 | 1.42E-03 | 2.98E+02 | 3.02E-02 | USEPA, 2001 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 7.04E+02 | 4.69E+02 | 6.66E-01 | 3.77E-01 | 9.96E+03 | 1.23E+04 | 1.47E-04 | 2.98E+02 | 3.27E-03 | PADEP, 2019 |
| 1,2-Dibromoethane | 106-93-4 | 5.83E+02 | 4.05E+02 | 6.94E-01 | 3.97E-01 | 8.31E+03 | 1.01E+04 | 6.50E-04 | 2.98E+02 | 1.62E-02 | PADEP, 2019 |
| 1,2-Dichloroethane | 107-06-2 | 5.61E+02 | 3.57E+02 | 6.36E-01 | 3.54E-01 | 7.64E+03 | 8.46E+03 | 9.78E-04 | 2.98E+02 | 2.66E-02 | USEPA, 2001 |
| 1,2-Dichloropropane | 78-87-5 | 5.72E+02 | 3.70E+02 | 6.46E-01 | 3.62E-01 | 7.59E+03 | 8.57E+03 | 2.80E-03 | 2.98E+02 | 7.57E-02 | USEPA, 2001 |
| 1,4-Dichlorobenzene | 106-46-7 | 6.85E+02 | 4.47E+02 | 6.53E-01 | 3.67E-01 | 9.27E+03 | 1.12E+04 | 2.43E-03 | 2.98E+02 | 5.73E-02 | USEPA, 2001 |
| 2-Hexanone | 591-78-6 | 6.01E+02 | 4.01E+02 | 6.67E-01 | 3.78E-01 | 8.61E+03 | 1.02E+04 | 9.32E-05 | 2.98E+02 | 2.32E-03 | PADEP, 2019 |
| Benzene | 71-43-2 | 5.62E+02 | 3.53E+02 | 6.28E-01 | 3.49E-01 | 7.34E+03 | 8.06E+03 | 5.56E-03 | 2.98E+02 | 1.54E-01 | USEPA, 2001 |
| Bromodichloromethane | 75-27-4 | 5.86E+02 | 3.63E+02 | 6.20E-01 | 3.43E-01 | 7.80E+03 | 8.60E+03 | 1.60E-03 | 2.98E+02 | 4.31E-02 | USEPA, 2001 |
| Bromoform | 75-25-2 | 6.96E+02 | 4.22E+02 | 6.07E-01 | 3.33E-01 | 9.48E+03 | 1.08E+04 | 5.34E-04 | 2.98E+02 | 1.28E-02 | USEPA, 2001 |
| Bromomethane | 74-83-9 | 4.67E+02 | 2.77E+02 | 5.93E-01 | 3.22E-01 | 5.71E+03 | 5.59E+03 | 6.24E-03 | 2.98E+02 | 1.97E-01 | USEPA, 2001 |
| Carbon Tetrachloride | 56-23-5 | 5.57E+02 | 3.50E+02 | 6.29E-01 | 3.49E-01 | 7.13E+03 | 7.80E+03 | 3.05E-02 | 2.98E+02 | 8.58E-01 | USEPA, 2001 |
| Chloroform | 67-66-3 | 5.36E+02 | 3.34E+02 | 6.23E-01 | 3.45E-01 | 6.99E+03 | 7.49E+03 | 3.66E-03 | 2.98E+02 | 1.05E-01 | USEPA, 2001 |
| cis-1,2-Dichloroethene | 156-59-2 | 5.44E+02 | 3.34E+02 | 6.13E-01 | 3.38E-01 | 7.19E+03 | 7.67E+03 | 4.07E-03 | 2.98E+02 | 1.15E-01 | USEPA, 2001 |
| cis-1,3-Dichloropropene | 10061-01-5 | 5.87E+02 | 3.81E+02 | 6.49E-01 | 3.64E-01 | 7.90E+03 | 9.03E+03 | 1.77E-02 | 2.98E+02 | 4.67E-01 | USEPA, 2001 |
| Dibromochloromethane | 124-48-1 | 6.78E+02 | 4.16E+02 | 6.14E-01 | 3.38E-01 | 5.90E+03 | 6.74E+03 | 7.83E-04 | 2.98E+02 | 2.33E-02 | USEPA, 2001 |
| Ethylbenzene | 100-41-4 | 6.17E+02 | 4.09E+02 | 6.63E-01 | 3.75E-01 | 8.50E+03 | 1.01E+04 | 7.88E-03 | 2.98E+02 | 1.97E-01 | USEPA, 2001 |
| Hexachlorobutadiene | 87-68-3 | 7.38E+02 | 4.86E+02 | 6.59E-01 | 3.71E-01 | 1.02E+04 | 1.26E+04 | 8.15E-03 | 2.98E+02 | 1.78E-01 | USEPA, 2001 |
| Isopropylbenzene | 98-82-8 | 6.31E+02 | 4.26E+02 | 6.74E-01 | 3.83E-01 | 1.03E+04 | 1.26E+04 | 1.15E-02 | 2.98E+02 | 2.53E-01 | PADEP, 2019 |
| Naphthalene | 91-20-3 | 7.48E+02 | 4.91E+02 | 6.56E-01 | 3.70E-01 | 1.04E+04 | 1.28E+04 | 4.83E-04 | 2.98E+02 | 1.05E-02 | USEPA, 2001 |
| Tetrachloroethene | 127-18-4 | 6.20E+02 | 3.94E+02 | 6.36E-01 | 3.55E-01 | 8.29E+03 | 9.49E+03 | 1.84E-02 | 2.98E+02 | 4.74E-01 | USEPA, 2001 |
| Toluene | 108-88-3 | 5.92E+02 | 3.84E+02 | 6.49E-01 | 3.64E-01 | 7.93E+03 | 9.09E+03 | 6.63E-03 | 2.98E+02 | 1.74E-01 | USEPA, 2001 |
| trans-1,3-Dichloropropene | 10061-02-6 | 5.87E+02 | 3.81E+02 | 6.49E-01 | 3.64E-01 | 7.90E+03 | 9.03E+03 | 1.77E-02 | 2.98E+02 | 4.67E-01 | USEPA, 2001 |
| Trichloroethene | 79-01-6 | 5.44E+02 | 3.60E+02 | 6.62E-01 | 3.74E-01 | 7.51E+03 | 8.48E+03 | 1.03E-02 | 2.98E+02 | 2.80E-01 | USEPA, 2001 |
| Vinyl Chloride | 75-01-4 | 4.32E+02 | 2.59E+02 | 6.00E-01 | 3.28E-01 | 5.25E+03 | 4.93E+03 | 2.71E-02 | 2.98E+02 | 8.84E-01 | USEPA, 2001 |
| Xylenes, Total | 1330-20-7 | 6.16E+02 | 4.13E+02 | 6.71E-01 | 3.80E-01 | 8.52E+03 | 1.02E+04 | 5.18E-03 | 2.98E+02 | 1.28E-01 | PADEP, 2019 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 7.89E+02 | 5.28E+02 | 6.69E-01 | 3.79E-01 | 1.09E+04 | 1.39E+04 | 3.08E-04 | 2.98E+02 | 6.30E-03 | PADEP, 2019 |
| 2-Methylnaphthalene | 91-57-6 | 7.61E+02 | 5.14E+02 | 6.76E-01 | 3.84E-01 | 1.26E+04 | 1.62E+04 | 5.18E-04 | 2.98E+02 | 9.44E-03 | PADEP, 2019 |
| Benzo(a)anthracene | 56-55-3 | 1.00E+03 | 7.08E+02 | 7.05E-01 | 4.06E-01 | 1.60E+04 | 2.29E+04 | 3.34E-06 | 2.98E+02 | 4.30E-05 | USEPA, 2001 |
| Bis(2-chloroethyl)ether | 111-44-4 | 6.60E+02 | 4.51E+02 | 6.84E-01 | 3.90E-01 | 1.08E+04 | 1.35E+04 | 1.80E-05 | 2.98E+02 | 3.76E-04 | USEPA, 2001 |
| Dibenzofuran | 132-64-9 | 8.24E+02 | 5.60E+02 | 6.80E-01 | 3.87E-01 | 1.20E+04 | 1.58E+04 | 1.08E-04 | 2.98E+02 | 2.02E-03 | NIST, 2017; USEPA, 2001 and 2012 |
| Hexachlorobenzene | 118-74-1 | 8.25E+02 | 5.83E+02 | 7.06E-01 | 4.07E-01 | 1.44E+04 | 1.99E+04 | 1.32E-03 | 2.98E+02 | 1.98E-02 | USEPA, 2001 |
| Hexachlorocyclopentadiene | 77-47-4 | 7.46E+02 | 5.12E+02 | 6.87E-01 | 3.92E-01 | 1.09E+04 | 1.42E+04 | 2.71E-02 | 2.98E+02 | 5.46E-01 | USEPA, 2001 |
| Hexachloroethane | 67-72-1 | 6.95E+02 | 4.58E+02 | 6.59E-01 | 3.72E-01 | 9.51E+03 | 1.16E+04 | 3.88E-03 | 2.98E+02 | 8.95E-02 | USEPA, 2001 |
| Nitrobenzene | 98-95-3 | 7.19E+02 | 4.84E+02 | 6.73E-01 | 3.82E-01 | 1.06E+04 | 1.33E+04 | 2.40E-05 | 2.98E+02 | 5.07E-04 | USEPA, 2001 |

Table A4-5
Henry's Law Constant at System Temperature
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| Soil and/or Groundwater Volatile Chemical of Potential Concern (Non-Vapor Intrusion) | CASRN | $T_C$ (°K) | $T_B$ (°K) | $T_B/T_C$ | n | $\Delta H_{v,b}$ (cal/mol) | $\Delta H_{v,TS}$ (cal/mol) | $H_R$ (atm-m$^3$/mol) | $T_r$ (°K) | $H'_{TS}$ | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pesticides | | | | | | | | | | | |
| Aldrin | 309-00-2 | 8.39E+02 | 6.03E+02 | 7.18E-01 | 4.10E-01 | 1.50E+04 | 2.12E+04 | 1.70E-04 | 2.98E+02 | 2.38E-03 | USEPA, 2001 |
| Heptachlor | 76-44-8 | 8.46E+02 | 6.04E+02 | 7.13E-01 | 4.10E-01 | 1.30E+04 | 1.83E+04 | 1.09E-03 | 2.98E+02 | 1.78E-02 | USEPA, 2001 |
| Heptachlor epoxide | 1024-57-3 | 8.49E+02 | 6.14E+02 | 7.23E-01 | 4.10E-01 | 1.60E+04 | 2.28E+04 | 9.51E-06 | 2.98E+02 | 1.23E-04 | USEPA, 2001 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 8.45E+02 | 5.48E+02 | 6.49E-01 | 3.64E-01 | 1.21E+04 | 1.52E+04 | 7.36E-04 | 2.98E+02 | 1.41E-02 | PADEP, 2019 |
| Aroclor 1232 | 11141-16-5 | 8.45E+02 | 5.63E+02 | 6.66E-01 | 3.77E-01 | 1.22E+04 | 1.58E+04 | 7.36E-04 | 2.98E+02 | 1.37E-02 | PADEP, 2019 |
| Aroclor 1242 | 53469-21-9 | 9.27E+02 | 6.18E+02 | 6.67E-01 | 3.77E-01 | 1.30E+04 | 1.71E+04 | 5.20E-04 | 2.98E+02 | 9.03E-03 | ATSDR, 2000 and USEPA, 2001 |
| Aroclor 1248 | 12672-29-6 | 9.49E+02 | 6.33E+02 | 6.67E-01 | 3.77E-01 | 1.20E+04 | 1.58E+04 | 1.03E-04 | 2.98E+02 | 1.91E-03 | USEPA, 2001 and 2012 |
| Aroclor 1254 | 11097-69-1 | 9.80E+02 | 6.53E+02 | 6.67E-01 | 3.77E-01 | 1.30E+04 | 1.72E+04 | 2.00E-03 | 2.98E+02 | 3.45E-02 | ATSDR, 2000 and USEPA, 2001 |
| Aroclor 1260 | 11096-82-5 | 1.01E+03 | 6.73E+02 | 6.67E-01 | 3.77E-01 | 1.30E+04 | 1.73E+04 | 4.60E-03 | 2.98E+02 | 7.89E-02 | ATSDR, 2000 and USEPA, 2001 |
| Dioxins/Furans | | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | 2,3,7,8-TCDD TEQ | 9.78E+02 | 6.52E+02 | 6.67E-01 | 3.77E-01 | 1.85E+04 | 2.45E+04 | 5.00E-05 | 2.98E+02 | 5.90E-04 | DOE, 2020 |
| Cyanide | | | | | | | | | | | |
| Cyanide | 57-12-5 | 4.49E+02 | 2.99E+02 | 6.67E-01 | 3.77E-01 | 1.50E+04 | 1.54E+04 | 1.33E-04 | 2.98E+02 | 2.53E-03 | USEPA, 2001 and 2012 |
| Metals (Total) | | | | | | | | | | | |
| Mercury | 7439-97-6 | 9.45E+02 | 6.30E+02 | 6.67E-01 | 3.77E-01 | 1.41E+04 | 1.86E+04 | 8.62E-03 | 2.98E+02 | 1.38E-01 | USEPA, 2001 and 2012 |

Notes:
-- = Not Evaluated; only volatile chemicals evaluated
CASRN = Chemical Abstract Services Registry Number

$$H'_{TS} = \frac{\exp\left[-\frac{\Delta H_{v,TS}}{R_c}\left(\frac{1}{T_s}-\frac{1}{T_r}\right)\right] \times H_R}{RT_S}$$

Where:

$$\Delta H_{v,TS} = \Delta H_{v,b}\left[\frac{\left(1-{}^{T_S}/_{T_C}\right)}{\left(1-{}^{T_B}/_{T_C}\right)}\right]^n$$

| Input Parameter | Variable | Values | Unit | Note |
|---|---|---|---|---|
| Henry's law constant at temperature | $H'_{TS}$ | calculated | unitless | USEPA (2001) |
| Enthalpy of vaporization at the system temperature | $\Delta H_{v,TS}$ | calculated | cal/mol | USEPA (2001) |
| System Temperature | $T_S$ | 289.2611 | °K | 16.1111 °C, (61 °F) average shallow subsurface for Virginia |
| Henry's law constant reference temperature | $T_R$ | look up | °K | See Source |
| Henry's law constant at the reference temperature | $H_R$ | look up | atm-m$^3$/mol | See Source |
| Gas constant | $R_C$ | 1.9872 | cal/mol°K | USEPA (2001) |
| Gas constant | R | 8.2E-05 | atm-m$^3$/mol°K | USEPA (2001) |
| Enthaply of vaporization at the normal boiling point | $\Delta H_{v,b}$ | look up | cal/mol | See Source |
| Critical temperature | $T_C$ | look up | °K | See Source |
| Boiling temperature | $T_B$ | look up | °K | See Source |
| Constant | n | see below | unitless | USEPA (2001) |

| IF Tb/Tc: | n equals: |
|---|---|
| <0.57 | 0.3 |
| 0.57 - 0.71 | 0.74(Tb/Tc) - 0.116 |
| >0.71 | 0.41 |

Table A4-5
Henry's Law Constant at System Temperature
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| Soil and/or Groundwater Volatile Chemical of Potential Concern (Non-Vapor Intrusion) | CASRN | $T_C$ (°K) | $T_B$ (°K) | $T_B/T_C$ | n | $\Delta H_{v,b}$ (cal/mol) | $\Delta H_{v,TS}$ (cal/mol) | $H_R$ (atm-$m^3$/mol) | $T_r$ (°K) | $H'_{TS}$ | Source |
|---|---|---|---|---|---|---|---|---|---|---|---|

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Table A4-6
Calculation of Receptor-Specific Volatilization Factors for the Soil-to-Outdoor Air Exposure Pathway
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| Soil Volatile Chemical of Potential Concern | CASRN | From USEPA (2020) | | | Calculated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $K_{oc}$ ($cm^3/g$) | $D_{ia}$ ($cm^2/s$) | $D_{iw}$ ($cm^2/s$) | $H'_{TS}$ (unitless) | $K_d$ ($cm^3/g$) | DA ($cm^2/s$) | $VF_r$ ($m^3/kg$) | $VF_{ind}$ ($m^3/kg$) | $VF_{sc}$ ($m^3/kg$) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | |
| 1,1,2-Trichloroethane | 79-00-5 | 6.07E+01 | 6.69E-02 | 1.00E-05 | 2.35E-02 | 3.64E-01 | 1.79E-04 | 1.19E+04 | 1.16E+04 | 1.92E+03 |
| 2-Hexanone | 591-78-6 | 1.50E+01 | 7.04E-02 | 8.44E-06 | 2.32E-03 | 8.99E-02 | 4.59E-05 | 2.34E+04 | 2.30E+04 | 3.79E+03 |
| Benzene | 71-43-2 | 1.46E+02 | 8.95E-02 | 1.03E-05 | 1.54E-01 | 8.75E-01 | 7.33E-04 | 5.86E+03 | 5.75E+03 | 9.48E+02 |
| Ethylbenzene | 100-41-4 | 4.46E+02 | 6.85E-02 | 8.46E-06 | 1.97E-01 | 2.68E+00 | 2.55E-04 | 9.93E+03 | 9.74E+03 | 1.61E+03 |
| Naphthalene | 91-20-3 | 1.54E+03 | 6.05E-02 | 8.38E-06 | 1.05E-02 | 9.26E+00 | 3.60E-06 | 8.36E+04 | 8.19E+04 | 1.35E+04 |
| Xylenes, Total | 1330-20-7 | 3.83E+02 | 6.85E-02 | 8.46E-06 | 1.28E-01 | 2.30E+00 | 1.94E-04 | 1.14E+04 | 1.12E+04 | 1.84E+03 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | |
| Benzo(a)anthracene | 56-55-3 | 1.77E+05 | 2.61E-02 | 6.75E-06 | 4.30E-05 | 1.06E+03 | 9.67E-11 | 1.61E+07 | 1.58E+07 | 2.61E+06 |
| Dioxins/Furans | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | 2,3,7,8-TCDD TEQ | 2.49E+05 | 4.70E-02 | 6.76E-06 | 5.90E-04 | 1.49E+03 | 1.02E-09 | 4.97E+06 | 4.87E+06 | 8.04E+05 |
| Metals (Total) | | | | | | | | | | |
| Mercury | 7439-97-6 | -- | 3.07E-02 | 6.30E-06 | 1.38E-01 | 5.20E+01 | 4.34E-06 | 7.62E+04 | 7.47E+04 | 1.23E+04 |

Notes:
-- = Not Evaluated; only volatile chemicals evaluated
CASRN = Chemical Abstract Services Registry Number

$$VF\ (m^3/kg) = \frac{(Q/C_{vol}) \times (3.14 \times DA \times T)^{0.5} \times 10^{-4}\ (m^2/cm^2)}{(2 \times P_b \times D_A)} \quad \text{(USEPA, 2002)}$$

$$VF_{sc}\ (m^3/kg) = \frac{(Q/C_{sa}) \times (3.14 \times DA \times T)^{0.5} \times 10^{-4}\ (m^2/cm^2)}{(2 \times P_b \times D_A) \times F_d} \quad \text{(USEPA, 2002)}$$

$$D_A\ (cm^2/s) = \frac{[(\theta_a^{10/3} \times D_{ia} \times H'_{TS} + \theta_w^{10/3} \times D_{iw})/n^2]}{P_b \times K_d + \theta_w + \theta_a \times H'_{TS}} \quad \text{(USEPA, 2002)}$$

| Values | Parameter | | Parameter Definition |
|---|---|---|---|
| calc | VF | | Volatilization factor ($m^3/kg$) |
| calc | $VF_{sc}$ | | Volatilization factor, subchronic ($m^3/kg$) |
| 93.77 | $Q/C_{vol}$ | $= Q/C_{wind}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) (chronic) |
| 14.31 | $Q/C_{vol}$ | $= Q/C_{sa}$ | Inverse of mean concentration at center of 0.5-acre-square source ($g/m^2$-s per $kg/m^3$) (subchronic) |
| calc | $D_A$ | | Apparent diffusivity ($cm^2/s$) |
| 8.2E+08 | $T_r$ | | Exposure interval (s); residential/recreational exposure of 26 years (chronic) |
| 7.9E+08 | $T_{ind}$ | | Exposure interval (s); industrial exposure of 25 years (chronic) |
| 3.2E+07 | $T_{sc}$ | | Exposure interval (s); construction project duration of 1 year (subchronic) |
| 0.185 | $F_d$ | | Dispersion correction factor (unitless) |
| 1.5 | $P_b$ | | Dry soil bulk density ($g/cm^3$) |

Table A4-6

Calculation of Receptor-Specific Volatilization Factors for the Soil-to-Outdoor Air Exposure Pathway

Remedial Investigation Report

Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| Soil Volatile Chemical of Potential Concern | CASRN | From USEPA (2020) | | | Calculated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $K_{oc}$ ($cm^3/g$) | $D_{ia}$ ($cm^2/s$) | $D_{iw}$ ($cm^2/s$) | $H'_{TS}$ (unitless) | $K_d$ ($cm^3/g$) | DA ($cm^2/s$) | $VF_r$ ($m^3/kg$) | $VF_{ind}$ ($m^3/kg$) | $VF_{sc}$ ($m^3/kg$) |
| | | 0.28 | $\theta_a$ | $n - \theta_w$ | Air filled soil porosity ($L_{air}/L_{soil}$) | | | | | |
| | | 0.43 | n | $1 - (P_b / P_s)$ | Total soil porosity ($L_{pore}/L_{soil}$) | | | | | |
| | | 0.15 | $\theta_w$ | | Water-filled soil porosity ($L_{water}/L_{soil}$) | | | | | |
| | | 2.65 | $P_s$ | | Soil particle density ($g/cm^3$) | | | | | |
| | | chem-specific | $D_{ia}$ | | Diffusivity in air ($cm^2/s$) | | | | | |
| | | chem-specific | $H'_{TS}$ | | Henry's Law constant at system temperature, dimensionless (unitless) | | | | | |
| | | chem-specific | $D_{iw}$ | | Diffusivity in water ($cm^2/s$) | | | | | |
| | | $K_{oc}*F_{oc}$ | $K_d$ | | Soil-water partition coefficient ($cm^3/g$) =Koc*foc | | | | | |
| | | chem-specific | $K_{oc}$ | | Soil organic carbon-water partition coefficient ($cm^3/g$) | | | | | |
| | | 0.006 | $F_{oc}$ | | fraction organic carbon in soil (g/g) | | | | | |

References:


United States Environmental Protection Agency (USEPA). 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002.

USEPA. 2012. Estimation Programs Interface Suite™ for Microsoft® Windows, v 4.11. United States Environmental Protection Agency, Washington, DC, USA. (Used to estimate $K_{oc}$ for cyanide)

USEPA. 2020. Regional Screening Level (RSL) Table and User's Guide, Dated Nov 2020. https://www.epa.gov/risk/regional-screening-levels-rsls

Table A4-7
Dermal Worksheet for Groundwater (RME: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Construction Worker - Groundwater (Trench) | | | | On-Site Hypothetical Resident (Child) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 4 | Selected DA-event | | t-event (hrs/event): | 0.54 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | ($L/cm^2$-event) | ($L/cm^2$-event) | | ($L/cm^2$-event) | ($L/cm^2$-event) | ($L/cm^2$-event) | | ($L/cm^2$-event) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 6.94E-03 | 9.16E-01 | 3.46E-02 | 2.20E+00 | 3.67E-05 | 4.00E-05 | DA-Event 2 | 4.00E-05 | 1.35E-05 | 1.68E-05 | DA-Event 1 | 1.35E-05 |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 5.04E-03 | 5.87E-01 | 2.24E-02 | 1.41E+00 | 2.14E-05 | 2.58E-05 | DA-Event 2 | 2.58E-05 | 7.85E-06 | 8.72E-06 | DA-Event 1 | 7.85E-06 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1 | 7.05E-02 | 1.09E+00 | 3.65E-01 | 2.62E+00 | 4.07E-04 | 4.13E-04 | DA-Event 2 | 4.13E-04 | 1.50E-04 | 2.34E-04 | DA-Event 1 | 1.50E-04 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1 | 6.85E-03 | 2.21E+00 | 4.05E-02 | 5.32E+00 | 5.64E-05 | 5.79E-05 | DA-Event 1 | 5.64E-05 | 2.07E-05 | 3.51E-05 | DA-Event 1 | 2.07E-05 |
| 1,2-Dibromoethane | 106-93-4 | 1 | 2.78E-03 | 1.19E+00 | 1.47E-02 | 2.84E+00 | 1.67E-05 | 1.76E-05 | DA-Event 2 | 1.76E-05 | 6.15E-06 | 8.17E-06 | DA-Event 1 | 6.15E-06 |
| 1,2-Dichloroethane | 107-06-2 | 1 | 4.20E-03 | 3.77E-01 | 1.61E-02 | 9.04E-01 | 1.43E-05 | 1.97E-05 | DA-Event 2 | 1.97E-05 | 5.24E-06 | 5.45E-06 | DA-Event 1 | 5.24E-06 |
| 1,2-Dichloropropane | 78-87-5 | 1 | 7.53E-03 | 4.51E-01 | 3.08E-02 | 1.08E+00 | 2.80E-05 | 3.62E-05 | DA-Event 2 | 3.62E-05 | 1.03E-05 | 1.10E-05 | DA-Event 1 | 1.03E-05 |
| 1,4-Dichlorobenzene | 106-46-7 | 1 | 4.53E-02 | 7.00E-01 | 2.11E-01 | 1.68E+00 | 2.09E-04 | 2.26E-04 | DA-Event 2 | 2.26E-04 | 7.70E-05 | 9.66E-05 | DA-Event 1 | 7.70E-05 |
| 2-Hexanone | 591-78-6 | 1 | 3.55E-03 | 3.83E-01 | 1.37E-02 | 9.18E-01 | 1.21E-05 | 1.68E-05 | DA-Event 2 | 1.68E-05 | 4.46E-06 | 4.64E-06 | DA-Event 1 | 4.46E-06 |
| Benzene | 71-43-2 | 1 | 1.49E-02 | 2.88E-01 | 5.07E-02 | 6.91E-01 | 4.42E-05 | 6.57E-05 | DA-Event 2 | 6.57E-05 | 1.62E-05 | 1.67E-05 | DA-Event 1 | 1.62E-05 |
| Bromodichloromethane | 75-27-4 | 1 | 4.02E-03 | 8.70E-01 | 1.98E-02 | 2.09E+00 | 2.07E-05 | 2.29E-05 | DA-Event 2 | 2.29E-05 | 7.61E-06 | 9.26E-06 | DA-Event 1 | 7.61E-06 |
| Bromoform | 75-25-2 | 1 | 2.35E-03 | 2.74E+00 | 1.44E-02 | 6.57E+00 | 2.15E-05 | 2.23E-05 | DA-Event 1 | 2.15E-05 | 7.90E-06 | 1.43E-05 | DA-Event 1 | 7.90E-06 |
| Bromomethane | 74-83-9 | 1 | 2.84E-03 | 3.58E-01 | 1.06E-02 | 8.58E-01 | 9.39E-06 | 1.33E-05 | DA-Event 2 | 1.33E-05 | 3.45E-06 | 3.57E-06 | DA-Event 1 | 3.45E-06 |
| Carbon Tetrachloride | 56-23-5 | 1 | 1.63E-02 | 7.64E-01 | 7.78E-02 | 1.83E+00 | 7.88E-05 | 8.73E-05 | DA-Event 2 | 8.73E-05 | 2.89E-05 | 3.50E-05 | DA-Event 1 | 2.89E-05 |
| Chloroform | 67-66-3 | 1 | 6.83E-03 | 4.90E-01 | 2.87E-02 | 1.18E+00 | 2.64E-05 | 3.34E-05 | DA-Event 2 | 3.34E-05 | 9.71E-06 | 1.05E-05 | DA-Event 1 | 9.71E-06 |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 1.10E-02 | 3.67E-01 | 4.17E-02 | 8.81E-01 | 3.68E-05 | 5.07E-05 | DA-Event 2 | 5.07E-05 | 1.35E-05 | 1.41E-05 | DA-Event 1 | 1.35E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 3.06E-05 | 3.99E-05 | DA-Event 2 | 3.99E-05 | 1.12E-05 | 1.19E-05 | DA-Event 1 | 1.12E-05 |
| Dibromochloromethane | 124-48-1 | 1 | 2.89E-03 | 1.54E+00 | 1.60E-02 | 3.70E+00 | 1.98E-05 | 2.04E-05 | DA-Event 2 | 2.04E-05 | 7.29E-06 | 1.06E-05 | DA-Event 1 | 7.29E-06 |
| Ethylbenzene | 100-41-4 | 1 | 4.93E-02 | 4.13E-01 | 1.95E-01 | 9.92E-01 | 1.75E-04 | 2.13E-04 | DA-Event 2 | 2.13E-04 | 6.44E-05 | 7.08E-05 | DA-Event 1 | 6.44E-05 |
| Hexachlorobutadiene | 87-68-3 | 0.9 | 8.10E-02 | 3.03E+00 | 5.03E-01 | 7.28E+00 | 7.02E-04 | 8.34E-04 | DA-Event 1 | 7.02E-04 | 2.58E-04 | 6.66E-04 | DA-Event 1 | 2.58E-04 |
| Isopropylbenzene | 98-82-8 | 1 | 8.97E-02 | 4.95E-01 | 3.78E-01 | 1.19E+00 | 3.49E-04 | 3.80E-04 | DA-Event 2 | 3.80E-04 | 1.28E-04 | 1.55E-04 | DA-Event 1 | 1.28E-04 |
| Naphthalene | 91-20-3 | 1 | 4.66E-02 | 5.49E-01 | 2.03E-01 | 1.32E+00 | 1.91E-04 | 2.16E-04 | DA-Event 2 | 2.16E-04 | 7.01E-05 | 8.22E-05 | DA-Event 1 | 7.01E-05 |
| Tetrachloroethene | 127-18-4 | 1 | 3.34E-02 | 8.92E-01 | 1.65E-01 | 2.14E+00 | 1.74E-04 | 1.84E-04 | DA-Event 2 | 1.84E-04 | 6.41E-05 | 8.47E-05 | DA-Event 1 | 6.41E-05 |
| Toluene | 108-88-3 | 1 | 3.11E-02 | 3.45E-01 | 1.15E-01 | 8.28E-01 | 1.01E-04 | 1.35E-04 | DA-Event 2 | 1.35E-04 | 3.71E-05 | 3.90E-05 | DA-Event 1 | 3.71E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 3.06E-05 | 3.99E-05 | DA-Event 2 | 3.99E-05 | 1.12E-05 | 1.19E-05 | DA-Event 1 | 1.12E-05 |
| Trichloroethene | 79-01-6 | 1 | 1.16E-02 | 5.72E-01 | 5.11E-02 | 1.37E+00 | 4.85E-05 | 5.81E-05 | DA-Event 2 | 5.81E-05 | 1.78E-05 | 1.99E-05 | DA-Event 1 | 1.78E-05 |
| Vinyl Chloride | 75-01-4 | 1 | 8.38E-03 | 2.35E-01 | 2.55E-02 | 5.65E-01 | 2.25E-05 | 3.67E-05 | DA-Event 2 | 3.67E-05 | 8.26E-06 | 8.46E-06 | DA-Event 1 | 8.26E-06 |
| Xylenes, Total | 1330-20-7 | 1 | 5.00E-02 | 4.13E-01 | 1.98E-01 | 9.92E-01 | 1.78E-04 | 2.16E-04 | DA-Event 2 | 2.16E-04 | 6.53E-05 | 7.18E-05 | DA-Event 1 | 6.53E-05 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1 | 9.43E-02 | 7.68E-01 | 4.50E-01 | 1.84E+00 | 4.57E-04 | 4.64E-04 | DA-Event 2 | 4.64E-04 | 1.68E-04 | 2.39E-04 | DA-Event 1 | 1.68E-04 |
| 2,4,6-Trichlorophenol | 88-06-2 | 1 | 3.46E-02 | 1.34E+00 | 1.87E-01 | 3.22E+00 | 2.22E-04 | 2.26E-04 | DA-Event 2 | 2.26E-04 | 8.14E-05 | 1.25E-04 | DA-Event 1 | 8.14E-05 |
| 2,4-Dinitrotoluene | 121-14-2 | 1 | 3.08E-03 | 1.10E+00 | 1.60E-02 | 2.64E+00 | 1.79E-05 | 1.90E-05 | DA-Event 2 | 1.90E-05 | 6.56E-06 | 8.53E-06 | DA-Event 1 | 6.56E-06 |
| 2,6-Dinitrotoluene | 606-20-2 | 1 | 3.70E-03 | 1.10E+00 | 1.92E-02 | 2.64E+00 | 2.15E-05 | 2.28E-05 | DA-Event 2 | 2.28E-05 | 7.89E-06 | 1.03E-05 | DA-Event 1 | 7.89E-06 |
| 2-Methylnaphthalene | 91-57-6 | 1 | 9.17E-02 | 6.58E-01 | 4.21E-01 | 1.58E+00 | 4.11E-04 | 4.25E-04 | DA-Event 2 | 4.25E-04 | 1.51E-04 | 2.02E-04 | DA-Event 1 | 1.51E-04 |
| 2-Nitrophenol | 88-75-5 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 3.21E-06 | 3.34E-06 | DA-Event 2 | 3.34E-06 | 1.18E-06 | 1.63E-06 | DA-Event 1 | 1.18E-06 |
| 3,3-Dichlorobenzidine | 91-94-1 | 1 | 1.28E-02 | 2.75E+00 | 7.83E-02 | 6.60E+00 | 1.17E-04 | 1.23E-04 | DA-Event 1 | 1.17E-04 | 4.31E-05 | 8.23E-05 | DA-Event 1 | 4.31E-05 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 1 | 3.15E-03 | 1.35E+00 | 1.71E-02 | 3.25E+00 | 2.03E-05 | 2.11E-05 | DA-Event 2 | 2.11E-05 | 7.44E-06 | 1.03E-05 | DA-Event 1 | 7.44E-06 |
| 4-Chloroaniline | 106-47-8 | 1 | 4.96E-03 | 5.45E-01 | 2.15E-02 | 1.31E+00 | 2.02E-05 | 2.49E-05 | DA-Event 2 | 2.49E-05 | 7.44E-06 | 8.14E-06 | DA-Event 1 | 7.44E-06 |
| 4-Nitrophenol | 100-02-7 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 3.21E-06 | 3.34E-06 | DA-Event 2 | 3.34E-06 | 1.18E-06 | 1.63E-06 | DA-Event 1 | 1.18E-06 |
| Atrazine | 1912-24-9 | 1 | 5.24E-03 | 1.70E+00 | 2.96E-02 | 4.07E+00 | 3.77E-05 | 3.87E-05 | DA-Event 1 | 3.77E-05 | 1.39E-05 | 2.11E-05 | DA-Event 1 | 1.39E-05 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1 | 1.78E-03 | 6.65E-01 | 8.19E-03 | 1.60E+00 | 8.02E-06 | 9.45E-06 | DA-Event 2 | 9.45E-06 | 2.95E-06 | 3.34E-06 | DA-Event 1 | 2.95E-06 |
| Dibenzofuran | 132-64-9 | 1 | 9.75E-02 | 9.20E-01 | 4.86E-01 | 2.21E+00 | 5.17E-04 | 5.20E-04 | DA-Event 2 | 5.20E-04 | 1.90E-04 | 2.93E-04 | DA-Event 1 | 1.90E-04 |
| Hexachlorocyclopentadiene | 77-47-4 | 0.9 | 1.03E-01 | 3.54E+00 | 6.54E-01 | 1.39E+01 | 9.65E-04 | 1.24E-03 | DA-Event 1 | 9.65E-04 | 3.54E-04 | 1.05E-03 | DA-Event 1 | 3.54E-04 |
| Hexachloroethane | 67-72-1 | 1 | 4.15E-02 | 2.23E+00 | 2.46E-01 | 5.34E+00 | 3.42E-04 | 3.62E-04 | DA-Event 1 | 3.42E-04 | 1.26E-04 | 2.46E-04 | DA-Event 1 | 1.26E-04 |

Table A4-7
Dermal Worksheet for Groundwater (RME: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: USEPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Construction Worker - Groundwater (Trench) | | | | On-Site Hypothetical Resident (Child) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 4 | Selected DA-event | | t-event (hrs/event): | 0.54 | Selected DA-event | |
| | | FA unitless | Kp cm/hr | Tau-event hrs/event | B Value | T* hr | DA-Event 1 (L/cm$^2$-event) | DA-Event 2 (L/cm$^2$-event) | Equation | DA-event (L/cm$^2$-event) | DA-Event 1 (L/cm$^2$-event) | DA-Event 2 (L/cm$^2$-event) | Equation | DA-event (L/cm$^2$-event) |
| n-Nitrosodi-n-propylamine | 621-64-7 | 1 | 2.33E-03 | 5.64E-01 | 1.02E-02 | 1.35E+00 | 9.67E-06 | 1.19E-05 | DA-Event 2 | 1.19E-05 | 3.55E-06 | 3.90E-06 | DA-Event 1 | 3.55E-06 |
| Nitrobenzene | 98-95-3 | 1 | 5.41E-03 | 5.14E-01 | 2.31E-02 | 1.23E+00 | 2.14E-05 | 2.68E-05 | DA-Event 2 | 2.68E-05 | 7.88E-06 | 8.55E-06 | DA-Event 1 | 7.88E-06 |
| Pentachlorophenol | 87-86-5 | 0.9 | 1.27E-01 | 3.26E+00 | 7.97E-01 | 1.25E+01 | 1.14E-03 | 1.48E-03 | DA-Event 1 | 1.14E-03 | 4.19E-04 | 1.26E-03 | DA-Event 1 | 4.19E-04 |
| Pesticides | | | | | | | | | | | | | | |
| Dieldrin | 60-57-1 | 0.8 | 3.26E-02 | 1.43E+01 | 2.45E-01 | 3.43E+01 | 5.45E-04 | 1.00E-03 | DA-Event 1 | 5.45E-04 | 2.00E-04 | 9.32E-04 | DA-Event 1 | 2.00E-04 |
| Heptachlor | 76-44-8 | 0.8 | 1.43E-01 | 1.30E+01 | 1.06E+00 | 5.01E+01 | 2.28E-03 | 5.50E-03 | DA-Event 1 | 2.28E-03 | 8.36E-04 | 5.31E-03 | DA-Event 1 | 8.36E-04 |
| Heptachlor epoxide | 1024-57-3 | 0.8 | 2.09E-02 | 1.59E+01 | 1.59E-01 | 3.82E+01 | 3.69E-04 | 6.73E-04 | DA-Event 1 | 3.69E-04 | 1.36E-04 | 6.23E-04 | DA-Event 1 | 1.36E-04 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 1.02E-03 | 1.04E-03 | DA-Event 1 | 1.02E-03 | 3.73E-04 | 7.29E-04 | DA-Event 1 | 3.73E-04 |
| Aroclor 1232 | 11141-16-5 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 1.02E-03 | 1.04E-03 | DA-Event 1 | 1.02E-03 | 3.73E-04 | 7.29E-04 | DA-Event 1 | 3.73E-04 |
| Cyanide | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | 1 | 1.00E-03 | 1.47E-01 | 1.96E-03 | 3.53E-01 | 2.12E-06 | 4.29E-06 | DA-Event 2 | 4.29E-06 | 7.79E-07 | 8.34E-07 | DA-Event 2 | 8.34E-07 |
| Metals (Total) | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 1 | 1.00E-03 | 1.49E-01 | 2.00E-03 | 3.57E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Antimony | 7440-36-0 | 1 | 1.00E-03 | 5.05E-01 | 4.24E-03 | 1.21E+00 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Arsenic | 7440-38-2 | 1 | 1.00E-03 | 2.76E-01 | 3.33E-03 | 6.63E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Barium | 7440-39-3 | 1 | 1.00E-03 | 6.18E-01 | 4.51E-03 | 1.48E+00 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Beryllium | 7440-41-7 | 1 | 1.00E-03 | 1.18E-01 | 1.15E-03 | 2.83E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Cadmium (Water) | 7440-43-9W | 1 | 1.00E-03 | 4.48E-01 | 4.08E-03 | 1.08E+00 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Chromium, Total | 7440-47-3 | 1 | 2.00E-03 | 2.06E-01 | 5.55E-03 | 4.93E-01 | 8.00E-06 | -- | DA-Event 1 | 8.00E-06 | 1.08E-06 | -- | DA-Event 1 | 1.08E-06 |
| Cobalt | 7440-48-4 | 1 | 4.00E-04 | 2.25E-01 | 1.18E-03 | 5.40E-01 | 1.60E-06 | -- | DA-Event 1 | 1.60E-06 | 2.16E-07 | -- | DA-Event 1 | 2.16E-07 |
| Iron | 7439-89-6 | 1 | 1.00E-03 | 2.16E-01 | 2.87E-03 | 5.19E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Manganese | 7439-96-5 | 1 | 1.00E-03 | 2.14E-01 | 2.85E-03 | 5.13E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Mercury | 7439-97-6 | 1 | 1.00E-03 | 3.49E+00 | 6.34E-03 | 8.36E+00 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Nickel | 7440-02-0 | 1 | 2.00E-04 | 2.24E-01 | 5.89E-04 | 5.38E-01 | 8.00E-07 | -- | DA-Event 1 | 8.00E-07 | 1.08E-07 | -- | DA-Event 1 | 1.08E-07 |
| Selenium | 7782-49-2 | 1 | 1.00E-03 | 2.91E-01 | 3.42E-03 | 6.99E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Silver | 7440-22-4 | 1 | 6.00E-04 | 4.23E-01 | 2.40E-03 | 1.01E+00 | 2.40E-06 | -- | DA-Event 1 | 2.40E-06 | 3.24E-07 | -- | DA-Event 1 | 3.24E-07 |
| Thallium | 7440-28-0 | 1 | 1.00E-03 | 1.47E+00 | 5.50E-03 | 3.52E+00 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Vanadium | 7440-62-2 | 1 | 1.00E-03 | 2.03E-01 | 2.75E-03 | 4.87E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 5.40E-07 | -- | DA-Event 1 | 5.40E-07 |
| Zinc | 7440-66-6 | 1 | 6.00E-04 | 2.44E-01 | 1.87E-03 | 5.86E-01 | 2.40E-06 | -- | DA-Event 1 | 2.40E-06 | 3.24E-07 | -- | DA-Event 1 | 3.24E-07 |

Parameters:
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
CF3 = Conversion Factor 3, 0.001 L/cm3
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T* = Time to Reach Steady-State
t-event = Event Duration (scenario-specific)
Tau-event = Lag Time per Event
DABS = Dermal Absorption Factor

References:
USEPA, 2004. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Final, July, EPA/540/R/99/005.

For Organic Compounds:
If t-event ≤ T*, then: DA-event 1 =

$$2\ x\ FA\ x\ K_p\ x\ CF3\ x\ \sqrt{\frac{6\ x\ \tau_{event}\ x\ t_{event}}{\pi}}$$

If t-event > T*, then: DA-event 2 =

$$FA\ x\ CF3\ x\ K_p\ x\ \left[\frac{t_{event}}{1+B} + (2\ x\ \tau_{event})\ x\ \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

For Inorganic Compounds:
DA-event 1 = KP x CF3 x t-event
No DA-event 2 equation for inorganics.

Table A4-7
Dermal Worksheet for Groundwater (RME: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: USEPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Hypothetical Resident (Adult) - Groundwater (Potable Use) | | | | On-Site Hypothetical Resident (Lifetime) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 0.71 | Selected DA-event | | t-event (hrs/event): | 0.67 | Selected DA-event | |
| | | FA unitless | Kp cm/hr | Tau-event hrs/event | B Value | T* hr | DA-Event 1 (L/cm$^2$-event) | DA-Event 2 (L/cm$^2$-event) | Equation | DA-event (L/cm$^2$-event) | DA-Event 1 (L/cm$^2$-event) | DA-Event 2 (L/cm$^2$-event) | Equation | DA-event (L/cm$^2$-event) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 6.94E-03 | 9.16E-01 | 3.46E-02 | 2.20E+00 | 1.55E-05 | 1.79E-05 | DA-Event 1 | 1.55E-05 | 1.50E-05 | 1.77E-05 | DA-Event 1 | 1.50E-05 |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 5.04E-03 | 5.87E-01 | 2.24E-02 | 1.41E+00 | 9.00E-06 | 9.55E-06 | DA-Event 1 | 9.00E-06 | 8.74E-06 | 9.36E-06 | DA-Event 1 | 8.74E-06 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1 | 7.05E-02 | 1.09E+00 | 3.65E-01 | 2.62E+00 | 1.72E-04 | 2.43E-04 | DA-Event 1 | 1.72E-04 | 1.67E-04 | 2.41E-04 | DA-Event 1 | 1.67E-04 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1 | 6.85E-03 | 2.21E+00 | 4.05E-02 | 5.32E+00 | 2.37E-05 | 3.62E-05 | DA-Event 1 | 2.37E-05 | 2.31E-05 | 3.60E-05 | DA-Event 1 | 2.31E-05 |
| 1,2-Dibromoethane | 106-93-4 | 1 | 2.78E-03 | 1.19E+00 | 1.47E-02 | 2.84E+00 | 7.05E-06 | 8.63E-06 | DA-Event 1 | 7.05E-06 | 6.85E-06 | 8.53E-06 | DA-Event 1 | 6.85E-06 |
| 1,2-Dichloroethane | 107-06-2 | 1 | 4.20E-03 | 3.77E-01 | 1.61E-02 | 9.04E-01 | 6.00E-06 | 6.15E-06 | DA-Event 1 | 6.00E-06 | 5.84E-06 | 5.99E-06 | DA-Event 1 | 5.84E-06 |
| 1,2-Dichloropropane | 78-87-5 | 1 | 7.53E-03 | 4.51E-01 | 3.08E-02 | 1.08E+00 | 1.18E-05 | 1.22E-05 | DA-Event 1 | 1.18E-05 | 1.15E-05 | 1.19E-05 | DA-Event 1 | 1.15E-05 |
| 1,4-Dichlorobenzene | 106-46-7 | 1 | 4.53E-02 | 7.00E-01 | 2.11E-01 | 1.68E+00 | 8.83E-05 | 1.03E-04 | DA-Event 1 | 8.83E-05 | 8.58E-05 | 1.01E-04 | DA-Event 1 | 8.58E-05 |
| 2-Hexanone | 591-78-6 | 1 | 3.55E-03 | 3.83E-01 | 1.37E-02 | 9.18E-01 | 5.11E-06 | 5.24E-06 | DA-Event 1 | 5.11E-06 | 4.97E-06 | 5.10E-06 | DA-Event 1 | 4.97E-06 |
| Benzene | 71-43-2 | 1 | 1.49E-02 | 2.88E-01 | 5.07E-02 | 6.91E-01 | 1.86E-05 | 1.91E-05 | DA-Event 2 | 1.91E-05 | 1.81E-05 | 1.85E-05 | DA-Event 1 | 1.81E-05 |
| Bromodichloromethane | 75-27-4 | 1 | 4.02E-03 | 8.70E-01 | 1.98E-02 | 2.09E+00 | 8.73E-06 | 9.93E-06 | DA-Event 1 | 8.73E-06 | 8.49E-06 | 9.77E-06 | DA-Event 1 | 8.49E-06 |
| Bromoform | 75-25-2 | 1 | 2.35E-03 | 2.74E+00 | 1.44E-02 | 6.57E+00 | 9.05E-06 | 1.47E-05 | DA-Event 1 | 9.05E-06 | 8.80E-06 | 1.46E-05 | DA-Event 1 | 8.80E-06 |
| Bromomethane | 74-83-9 | 1 | 2.84E-03 | 3.58E-01 | 1.06E-02 | 8.58E-01 | 3.96E-06 | 4.05E-06 | DA-Event 1 | 3.96E-06 | 3.84E-06 | 3.94E-06 | DA-Event 1 | 3.84E-06 |
| Carbon Tetrachloride | 56-23-5 | 1 | 1.63E-02 | 7.64E-01 | 7.78E-02 | 1.83E+00 | 3.32E-05 | 3.76E-05 | DA-Event 1 | 3.32E-05 | 3.23E-05 | 3.70E-05 | DA-Event 1 | 3.23E-05 |
| Chloroform | 67-66-3 | 1 | 6.83E-03 | 4.90E-01 | 2.87E-02 | 1.18E+00 | 1.11E-05 | 1.16E-05 | DA-Event 1 | 1.11E-05 | 1.08E-05 | 1.13E-05 | DA-Event 1 | 1.08E-05 |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 1.10E-02 | 3.67E-01 | 4.17E-02 | 8.81E-01 | 1.55E-05 | 1.59E-05 | DA-Event 1 | 1.55E-05 | 1.51E-05 | 1.55E-05 | DA-Event 1 | 1.51E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 1.29E-05 | 1.33E-05 | DA-Event 1 | 1.29E-05 | 1.25E-05 | 1.30E-05 | DA-Event 1 | 1.25E-05 |
| Dibromochloromethane | 124-48-1 | 1 | 2.89E-03 | 1.54E+00 | 1.60E-02 | 3.70E+00 | 8.36E-06 | 1.11E-05 | DA-Event 1 | 8.36E-06 | 8.13E-06 | 1.10E-05 | DA-Event 1 | 8.13E-06 |
| Ethylbenzene | 100-41-4 | 1 | 4.93E-02 | 4.13E-01 | 1.95E-01 | 9.92E-01 | 7.38E-05 | 7.78E-05 | DA-Event 1 | 7.38E-05 | 7.18E-05 | 7.62E-05 | DA-Event 1 | 7.18E-05 |
| Hexachlorobutadiene | 87-68-3 | 0.9 | 8.10E-02 | 3.03E+00 | 5.03E-01 | 7.28E+00 | 2.96E-04 | 6.75E-04 | DA-Event 1 | 2.96E-04 | 2.87E-04 | 6.73E-04 | DA-Event 1 | 2.87E-04 |
| Isopropylbenzene | 98-82-8 | 1 | 8.97E-02 | 4.95E-01 | 3.78E-01 | 1.19E+00 | 1.47E-04 | 1.66E-04 | DA-Event 1 | 1.47E-04 | 1.43E-04 | 1.64E-04 | DA-Event 1 | 1.43E-04 |
| Naphthalene | 91-20-3 | 1 | 4.66E-02 | 5.49E-01 | 2.03E-01 | 1.32E+00 | 8.04E-05 | 8.88E-05 | DA-Event 1 | 8.04E-05 | 7.82E-05 | 8.73E-05 | DA-Event 1 | 7.82E-05 |
| Tetrachloroethene | 127-18-4 | 1 | 3.34E-02 | 8.92E-01 | 1.65E-01 | 2.14E+00 | 7.35E-05 | 8.96E-05 | DA-Event 1 | 7.35E-05 | 7.14E-05 | 8.85E-05 | DA-Event 1 | 7.14E-05 |
| Toluene | 108-88-3 | 1 | 3.11E-02 | 3.45E-01 | 1.15E-01 | 8.28E-01 | 4.25E-05 | 4.37E-05 | DA-Event 1 | 4.25E-05 | 4.14E-05 | 4.26E-05 | DA-Event 1 | 4.14E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 1.29E-05 | 1.33E-05 | DA-Event 1 | 1.29E-05 | 1.25E-05 | 1.30E-05 | DA-Event 1 | 1.25E-05 |
| Trichloroethene | 79-01-6 | 1 | 1.16E-02 | 5.72E-01 | 5.11E-02 | 1.37E+00 | 2.04E-05 | 2.18E-05 | DA-Event 1 | 2.04E-05 | 1.99E-05 | 2.14E-05 | DA-Event 1 | 1.99E-05 |
| Vinyl Chloride | 75-01-4 | 1 | 8.38E-03 | 2.35E-01 | 2.55E-02 | 5.65E-01 | 9.47E-06 | 9.85E-06 | DA-Event 2 | 9.85E-06 | 9.20E-06 | 9.53E-06 | DA-Event 2 | 9.53E-06 |
| Xylenes, Total | 1330-20-7 | 1 | 5.00E-02 | 4.13E-01 | 1.98E-01 | 9.92E-01 | 7.49E-05 | 7.89E-05 | DA-Event 1 | 7.49E-05 | 7.28E-05 | 7.73E-05 | DA-Event 1 | 7.28E-05 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1 | 9.43E-02 | 7.68E-01 | 4.50E-01 | 1.84E+00 | 1.92E-04 | 2.50E-04 | DA-Event 1 | 1.92E-04 | 1.87E-04 | 2.47E-04 | DA-Event 1 | 1.87E-04 |
| 2,4,6-Trichlorophenol | 88-06-2 | 1 | 3.46E-02 | 1.34E+00 | 1.87E-01 | 3.22E+00 | 9.33E-05 | 1.30E-04 | DA-Event 1 | 9.33E-05 | 9.07E-05 | 1.29E-04 | DA-Event 1 | 9.07E-05 |
| 2,4-Dinitrotoluene | 121-14-2 | 1 | 3.08E-03 | 1.10E+00 | 1.60E-02 | 2.64E+00 | 7.53E-06 | 9.04E-06 | DA-Event 1 | 7.53E-06 | 7.32E-06 | 8.92E-06 | DA-Event 1 | 7.32E-06 |
| 2,6-Dinitrotoluene | 606-20-2 | 1 | 3.70E-03 | 1.10E+00 | 1.92E-02 | 2.64E+00 | 9.04E-06 | 1.09E-05 | DA-Event 1 | 9.04E-06 | 8.79E-06 | 1.07E-05 | DA-Event 1 | 8.79E-06 |
| 2-Methylnaphthalene | 91-57-6 | 1 | 9.17E-02 | 6.58E-01 | 4.21E-01 | 1.58E+00 | 1.73E-04 | 2.13E-04 | DA-Event 1 | 1.73E-04 | 1.68E-04 | 2.10E-04 | DA-Event 1 | 1.68E-04 |
| 2-Nitrophenol | 88-75-5 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 1.35E-06 | 1.71E-06 | DA-Event 1 | 1.35E-06 | 1.31E-06 | 1.70E-06 | DA-Event 1 | 1.31E-06 |
| 3,3-Dichlorobenzidine | 91-94-1 | 1 | 1.28E-02 | 2.75E+00 | 7.83E-02 | 6.60E+00 | 4.94E-05 | 8.43E-05 | DA-Event 1 | 4.94E-05 | 4.81E-05 | 8.39E-05 | DA-Event 1 | 4.81E-05 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 1 | 3.15E-03 | 1.35E+00 | 1.71E-02 | 3.25E+00 | 8.53E-06 | 1.09E-05 | DA-Event 1 | 8.53E-06 | 8.30E-06 | 1.07E-05 | DA-Event 1 | 8.30E-06 |
| 4-Chloroaniline | 106-47-8 | 1 | 4.96E-03 | 5.45E-01 | 2.15E-02 | 1.31E+00 | 8.53E-06 | 8.97E-06 | DA-Event 1 | 8.53E-06 | 8.29E-06 | 8.78E-06 | DA-Event 1 | 8.29E-06 |
| 4-Nitrophenol | 100-02-7 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 1.35E-06 | 1.71E-06 | DA-Event 1 | 1.35E-06 | 1.31E-06 | 1.70E-06 | DA-Event 1 | 1.31E-06 |
| Atrazine | 1912-24-9 | 1 | 5.24E-03 | 1.70E+00 | 2.96E-02 | 4.07E+00 | 1.59E-05 | 2.19E-05 | DA-Event 1 | 1.59E-05 | 1.55E-05 | 2.17E-05 | DA-Event 1 | 1.55E-05 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1 | 1.78E-03 | 6.65E-01 | 8.19E-03 | 1.60E+00 | 3.38E-06 | 3.64E-06 | DA-Event 1 | 3.38E-06 | 3.29E-06 | 3.57E-06 | DA-Event 1 | 3.29E-06 |
| Dibenzofuran | 132-64-9 | 1 | 9.75E-02 | 9.20E-01 | 4.86E-01 | 2.21E+00 | 2.18E-04 | 3.04E-04 | DA-Event 1 | 2.18E-04 | 2.12E-04 | 3.01E-04 | DA-Event 1 | 2.12E-04 |
| Hexachlorocyclopentadiene | 77-47-4 | 0.9 | 1.03E-01 | 3.54E+00 | 6.54E-01 | 1.39E+01 | 4.06E-04 | 1.06E-03 | DA-Event 1 | 4.06E-04 | 3.95E-04 | 1.06E-03 | DA-Event 1 | 3.95E-04 |
| Hexachloroethane | 67-72-1 | 1 | 4.15E-02 | 2.23E+00 | 2.46E-01 | 5.34E+00 | 1.44E-04 | 2.52E-04 | DA-Event 1 | 1.44E-04 | 1.40E-04 | 2.51E-04 | DA-Event 1 | 1.40E-04 |

Table A4-7
Dermal Worksheet for Groundwater (RME: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: USEPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Hypothetical Resident (Adult) - Groundwater (Potable Use) | | | | On-Site Hypothetical Resident (Lifetime) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 0.71 | Selected DA-event | | t-event (hrs/event): | 0.67 | Selected DA-event | |
| | | FA unitless | Kp cm/hr | Tau-event hrs/event | B Value | T* hr | DA-Event 1 (L/cm$^2$-event) | DA-Event 2 (L/cm$^2$-event) | Equation | DA-event (L/cm$^2$-event) | DA-Event 1 (L/cm$^2$-event) | DA-Event 2 (L/cm$^2$-event) | Equation | DA-event (L/cm$^2$-event) |
| n-Nitrosodi-n-propylamine | 621-64-7 | 1 | 2.33E-03 | 5.64E-01 | 1.02E-02 | 1.35E+00 | 4.07E-06 | 4.29E-06 | DA-Event 1 | 4.07E-06 | 3.96E-06 | 4.20E-06 | DA-Event 1 | 3.96E-06 |
| Nitrobenzene | 98-95-3 | 1 | 5.41E-03 | 5.14E-01 | 2.31E-02 | 1.23E+00 | 9.04E-06 | 9.45E-06 | DA-Event 1 | 9.04E-06 | 8.78E-06 | 9.24E-06 | DA-Event 1 | 8.78E-06 |
| Pentachlorophenol | 87-86-5 | 0.9 | 1.27E-01 | 3.26E+00 | 7.97E-01 | 1.25E+01 | 4.81E-04 | 1.27E-03 | DA-Event 1 | 4.81E-04 | 4.67E-04 | 1.27E-03 | DA-Event 1 | 4.67E-04 |
| Pesticides | | | | | | | | | | | | | | |
| Dieldrin | 60-57-1 | 0.8 | 3.26E-02 | 1.43E+01 | 2.45E-01 | 3.43E+01 | 2.30E-04 | 9.35E-04 | DA-Event 1 | 2.30E-04 | 2.23E-04 | 9.35E-04 | DA-Event 1 | 2.23E-04 |
| Heptachlor | 76-44-8 | 0.8 | 1.43E-01 | 1.30E+01 | 1.06E+00 | 5.01E+01 | 9.59E-04 | 5.32E-03 | DA-Event 1 | 9.59E-04 | 9.32E-04 | 5.32E-03 | DA-Event 1 | 9.32E-04 |
| Heptachlor epoxide | 1024-57-3 | 0.8 | 2.09E-02 | 1.59E+01 | 1.59E-01 | 3.82E+01 | 1.55E-04 | 6.26E-04 | DA-Event 1 | 1.55E-04 | 1.51E-04 | 6.25E-04 | DA-Event 1 | 1.51E-04 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 4.28E-04 | 7.44E-04 | DA-Event 1 | 4.28E-04 | 4.16E-04 | 7.40E-04 | DA-Event 1 | 4.16E-04 |
| Aroclor 1232 | 11141-16-5 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 4.28E-04 | 7.44E-04 | DA-Event 1 | 4.28E-04 | 4.16E-04 | 7.40E-04 | DA-Event 1 | 4.16E-04 |
| Cyanide | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | 1 | 1.00E-03 | 1.47E-01 | 1.96E-03 | 3.53E-01 | 8.93E-07 | 1.00E-06 | DA-Event 2 | 1.00E-06 | 8.68E-07 | 9.64E-07 | DA-Event 2 | 9.64E-07 |
| Metals (Total) | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 1 | 1.00E-03 | 1.49E-01 | 2.00E-03 | 3.57E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Antimony | 7440-36-0 | 1 | 1.00E-03 | 5.05E-01 | 4.24E-03 | 1.21E+00 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Arsenic | 7440-38-2 | 1 | 1.00E-03 | 2.76E-01 | 3.33E-03 | 6.63E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Barium | 7440-39-3 | 1 | 1.00E-03 | 6.18E-01 | 4.51E-03 | 1.48E+00 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Beryllium | 7440-41-7 | 1 | 1.00E-03 | 1.18E-01 | 1.15E-03 | 2.83E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Cadmium (Water) | 7440-43-9W | 1 | 1.00E-03 | 4.48E-01 | 4.08E-03 | 1.08E+00 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Chromium, Total | 7440-47-3 | 1 | 2.00E-03 | 2.06E-01 | 5.55E-03 | 4.93E-01 | 1.42E-06 | -- | DA-Event 1 | 1.42E-06 | 1.34E-06 | -- | DA-Event 1 | 1.34E-06 |
| Cobalt | 7440-48-4 | 1 | 4.00E-04 | 2.25E-01 | 1.18E-03 | 5.40E-01 | 2.84E-07 | -- | DA-Event 1 | 2.84E-07 | 2.68E-07 | -- | DA-Event 1 | 2.68E-07 |
| Iron | 7439-89-6 | 1 | 1.00E-03 | 2.16E-01 | 2.87E-03 | 5.19E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Manganese | 7439-96-5 | 1 | 1.00E-03 | 2.14E-01 | 2.85E-03 | 5.13E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Mercury | 7439-97-6 | 1 | 1.00E-03 | 3.49E+00 | 6.34E-03 | 8.36E+00 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Nickel | 7440-02-0 | 1 | 2.00E-04 | 2.24E-01 | 5.89E-04 | 5.38E-01 | 1.42E-07 | -- | DA-Event 1 | 1.42E-07 | 1.34E-07 | -- | DA-Event 1 | 1.34E-07 |
| Selenium | 7782-49-2 | 1 | 1.00E-03 | 2.91E-01 | 3.42E-03 | 6.99E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Silver | 7440-22-4 | 1 | 6.00E-04 | 4.23E-01 | 2.40E-03 | 1.01E+00 | 4.26E-07 | -- | DA-Event 1 | 4.26E-07 | 4.02E-07 | -- | DA-Event 1 | 4.02E-07 |
| Thallium | 7440-28-0 | 1 | 1.00E-03 | 1.47E+00 | 5.50E-03 | 3.52E+00 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Vanadium | 7440-62-2 | 1 | 1.00E-03 | 2.03E-01 | 2.75E-03 | 4.87E-01 | 7.10E-07 | -- | DA-Event 1 | 7.10E-07 | 6.71E-07 | -- | DA-Event 1 | 6.71E-07 |
| Zinc | 7440-66-6 | 1 | 6.00E-04 | 2.44E-01 | 1.87E-03 | 5.86E-01 | 4.26E-07 | -- | DA-Event 1 | 4.26E-07 | 4.02E-07 | -- | DA-Event 1 | 4.02E-07 |

Parameters:
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
CF3 = Conversion Factor 3, 0.001 L/cm3
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T* = Time to Reach Steady-State
t-event = Event Duration (scenario-specific)
Tau-event = Lag Time per Event
DABS = Dermal Absorption Factor

References:
USEPA, 2004. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Final, July, EPA/540/R/99/005.

For Organic Compounds:
If t-event ≤ T*, then: DA-event 1 =

$$2\ x\ FA\ x\ K_p\ x\ CF3\ x\ \sqrt{\frac{6\ x\ \tau_{event}\ x\ t_{event}}{\pi}}$$

If t-event > T*, then: DA-event 2 =

$$FA\ x\ CF3\ x\ K_p\ x\ \left[\frac{t_{event}}{1+B} + (2\ x\ \tau_{event})\ x\ \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

For Inorganic Compounds:
DA-event 1 = KP x CF3 x t-event
No DA-event 2 equation for inorganics.

Table A4-8
Dermal Worksheet for Groundwater (CTE: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Construction Worker - Groundwater (Trench) | | | | On-Site Hypothetical Resident (Adult) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 2 | Selected DA-event | | t-event (hrs/event): | 0.33 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 6.94E-03 | 9.16E-01 | 3.46E-02 | 2.20E+00 | 2.60E-05 | 2.66E-05 | DA-Event 1 | 2.60E-05 | 1.05E-05 | 1.54E-05 | DA-Event 1 | 1.05E-05 |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 5.04E-03 | 5.87E-01 | 2.24E-02 | 1.41E+00 | 1.51E-05 | 1.59E-05 | DA-Event 2 | 1.59E-05 | 6.13E-06 | 7.68E-06 | DA-Event 1 | 6.13E-06 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1 | 7.05E-02 | 1.09E+00 | 3.65E-01 | 2.62E+00 | 2.88E-04 | 3.09E-04 | DA-Event 1 | 2.88E-04 | 1.17E-04 | 2.23E-04 | DA-Event 1 | 1.17E-04 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1 | 6.85E-03 | 2.21E+00 | 4.05E-02 | 5.32E+00 | 3.98E-05 | 4.47E-05 | DA-Event 1 | 3.98E-05 | 1.62E-05 | 3.37E-05 | DA-Event 1 | 1.62E-05 |
| 1,2-Dibromoethane | 106-93-4 | 1 | 2.78E-03 | 1.19E+00 | 1.47E-02 | 2.84E+00 | 1.18E-05 | 1.22E-05 | DA-Event 1 | 1.18E-05 | 4.81E-06 | 7.59E-06 | DA-Event 1 | 4.81E-06 |
| 1,2-Dichloroethane | 107-06-2 | 1 | 4.20E-03 | 3.77E-01 | 1.61E-02 | 9.04E-01 | 1.01E-05 | 1.15E-05 | DA-Event 2 | 1.15E-05 | 4.09E-06 | 4.58E-06 | DA-Event 1 | 4.09E-06 |
| 1,2-Dichloropropane | 78-87-5 | 1 | 7.53E-03 | 4.51E-01 | 3.08E-02 | 1.08E+00 | 1.98E-05 | 2.16E-05 | DA-Event 2 | 2.16E-05 | 8.03E-06 | 9.42E-06 | DA-Event 1 | 8.03E-06 |
| 1,4-Dichlorobenzene | 106-46-7 | 1 | 4.53E-02 | 7.00E-01 | 2.11E-01 | 1.68E+00 | 1.48E-04 | 1.51E-04 | DA-Event 2 | 1.51E-04 | 6.02E-05 | 8.87E-05 | DA-Event 1 | 6.02E-05 |
| 2-Hexanone | 591-78-6 | 1 | 3.55E-03 | 3.83E-01 | 1.37E-02 | 9.18E-01 | 8.58E-06 | 9.76E-06 | DA-Event 2 | 9.76E-06 | 3.49E-06 | 3.91E-06 | DA-Event 1 | 3.49E-06 |
| Benzene | 71-43-2 | 1 | 1.49E-02 | 2.88E-01 | 5.07E-02 | 6.91E-01 | 3.13E-05 | 3.74E-05 | DA-Event 2 | 3.74E-05 | 1.27E-05 | 1.37E-05 | DA-Event 1 | 1.27E-05 |
| Bromodichloromethane | 75-27-4 | 1 | 4.02E-03 | 8.70E-01 | 1.98E-02 | 2.09E+00 | 1.47E-05 | 1.50E-05 | DA-Event 1 | 1.47E-05 | 5.95E-06 | 8.43E-06 | DA-Event 1 | 5.95E-06 |
| Bromoform | 75-25-2 | 1 | 2.35E-03 | 2.74E+00 | 1.44E-02 | 6.57E+00 | 1.52E-05 | 1.77E-05 | DA-Event 1 | 1.52E-05 | 6.17E-06 | 1.38E-05 | DA-Event 1 | 6.17E-06 |
| Bromomethane | 74-83-9 | 1 | 2.84E-03 | 3.58E-01 | 1.06E-02 | 8.58E-01 | 6.64E-06 | 7.67E-06 | DA-Event 2 | 7.67E-06 | 2.70E-06 | 2.98E-06 | DA-Event 1 | 2.70E-06 |
| Carbon Tetrachloride | 56-23-5 | 1 | 1.63E-02 | 7.64E-01 | 7.78E-02 | 1.83E+00 | 5.57E-05 | 5.71E-05 | DA-Event 2 | 5.71E-05 | 2.26E-05 | 3.18E-05 | DA-Event 1 | 2.26E-05 |
| Chloroform | 67-66-3 | 1 | 6.83E-03 | 4.90E-01 | 2.87E-02 | 1.18E+00 | 1.87E-05 | 2.02E-05 | DA-Event 2 | 2.02E-05 | 7.59E-06 | 9.08E-06 | DA-Event 1 | 7.59E-06 |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 1.10E-02 | 3.67E-01 | 4.17E-02 | 8.81E-01 | 2.60E-05 | 2.95E-05 | DA-Event 2 | 2.95E-05 | 1.06E-05 | 1.19E-05 | DA-Event 1 | 1.06E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 2.16E-05 | 2.37E-05 | DA-Event 2 | 2.37E-05 | 8.78E-06 | 1.02E-05 | DA-Event 1 | 8.78E-06 |
| Dibromochloromethane | 124-48-1 | 1 | 2.89E-03 | 1.54E+00 | 1.60E-02 | 3.70E+00 | 1.40E-05 | 1.47E-05 | DA-Event 1 | 1.40E-05 | 5.70E-06 | 1.00E-05 | DA-Event 1 | 5.70E-06 |
| Ethylbenzene | 100-41-4 | 1 | 4.93E-02 | 4.13E-01 | 1.95E-01 | 9.92E-01 | 1.24E-04 | 1.31E-04 | DA-Event 2 | 1.31E-04 | 5.03E-05 | 6.21E-05 | DA-Event 1 | 5.03E-05 |
| Hexachlorobutadiene | 87-68-3 | 0.9 | 8.10E-02 | 3.03E+00 | 5.03E-01 | 7.28E+00 | 4.96E-04 | 7.37E-04 | DA-Event 1 | 4.96E-04 | 2.02E-04 | 6.56E-04 | DA-Event 1 | 2.02E-04 |
| Isopropylbenzene | 98-82-8 | 1 | 8.97E-02 | 4.95E-01 | 3.78E-01 | 1.19E+00 | 2.47E-04 | 2.50E-04 | DA-Event 2 | 2.50E-04 | 1.00E-04 | 1.41E-04 | DA-Event 1 | 1.00E-04 |
| Naphthalene | 91-20-3 | 1 | 4.66E-02 | 5.49E-01 | 2.03E-01 | 1.32E+00 | 1.35E-04 | 1.39E-04 | DA-Event 2 | 1.39E-04 | 5.48E-05 | 7.40E-05 | DA-Event 1 | 5.48E-05 |
| Tetrachloroethene | 127-18-4 | 1 | 3.34E-02 | 8.92E-01 | 1.65E-01 | 2.14E+00 | 1.23E-04 | 1.27E-04 | DA-Event 1 | 1.23E-04 | 5.01E-05 | 7.87E-05 | DA-Event 1 | 5.01E-05 |
| Toluene | 108-88-3 | 1 | 3.11E-02 | 3.45E-01 | 1.15E-01 | 8.28E-01 | 7.14E-05 | 7.97E-05 | DA-Event 2 | 7.97E-05 | 2.90E-05 | 3.31E-05 | DA-Event 1 | 2.90E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 2.16E-05 | 2.37E-05 | DA-Event 2 | 2.37E-05 | 8.78E-06 | 1.02E-05 | DA-Event 1 | 8.78E-06 |
| Trichloroethene | 79-01-6 | 1 | 1.16E-02 | 5.72E-01 | 5.11E-02 | 1.37E+00 | 3.43E-05 | 3.60E-05 | DA-Event 2 | 3.60E-05 | 1.39E-05 | 1.76E-05 | DA-Event 1 | 1.39E-05 |
| Vinyl Chloride | 75-01-4 | 1 | 8.38E-03 | 2.35E-01 | 2.55E-02 | 5.65E-01 | 1.59E-05 | 2.04E-05 | DA-Event 2 | 2.04E-05 | 6.46E-06 | 6.74E-06 | DA-Event 1 | 6.46E-06 |
| Xylenes, Total | 1330-20-7 | 1 | 5.00E-02 | 4.13E-01 | 1.98E-01 | 9.92E-01 | 1.26E-04 | 1.33E-04 | DA-Event 2 | 1.33E-04 | 5.10E-05 | 6.31E-05 | DA-Event 1 | 5.10E-05 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1 | 9.43E-02 | 7.68E-01 | 4.50E-01 | 1.84E+00 | 3.23E-04 | 3.34E-04 | DA-Event 2 | 3.34E-04 | 1.31E-04 | 2.25E-04 | DA-Event 1 | 1.31E-04 |
| 2,4,6-Trichlorophenol | 88-06-2 | 1 | 3.46E-02 | 1.34E+00 | 1.87E-01 | 3.22E+00 | 1.57E-04 | 1.68E-04 | DA-Event 1 | 1.57E-04 | 6.36E-05 | 1.19E-04 | DA-Event 1 | 6.36E-05 |
| 2,4-Dinitrotoluene | 121-14-2 | 1 | 3.08E-03 | 1.10E+00 | 1.60E-02 | 2.64E+00 | 1.26E-05 | 1.30E-05 | DA-Event 1 | 1.26E-05 | 5.13E-06 | 7.89E-06 | DA-Event 1 | 5.13E-06 |
| 2,6-Dinitrotoluene | 606-20-2 | 1 | 3.70E-03 | 1.10E+00 | 1.92E-02 | 2.64E+00 | 1.52E-05 | 1.56E-05 | DA-Event 1 | 1.52E-05 | 6.16E-06 | 9.50E-06 | DA-Event 1 | 6.16E-06 |
| 2-Methylnaphthalene | 91-57-6 | 1 | 9.17E-02 | 6.58E-01 | 4.21E-01 | 1.58E+00 | 2.91E-04 | 2.96E-04 | DA-Event 2 | 2.96E-04 | 1.18E-04 | 1.88E-04 | DA-Event 1 | 1.18E-04 |
| 2-Nitrophenol | 88-75-5 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 2.27E-06 | 2.35E-06 | DA-Event 1 | 2.27E-06 | 9.22E-07 | 1.53E-06 | DA-Event 1 | 9.22E-07 |
| 3,3-Dichlorobenzidine | 91-94-1 | 1 | 1.28E-02 | 2.75E+00 | 7.83E-02 | 6.60E+00 | 8.30E-05 | 9.96E-05 | DA-Event 1 | 8.30E-05 | 3.37E-05 | 7.98E-05 | DA-Event 1 | 3.37E-05 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 1 | 3.15E-03 | 1.35E+00 | 1.71E-02 | 3.25E+00 | 1.43E-05 | 1.49E-05 | DA-Event 1 | 1.43E-05 | 5.82E-06 | 9.69E-06 | DA-Event 1 | 5.82E-06 |
| 4-Chloroaniline | 106-47-8 | 1 | 4.96E-03 | 5.45E-01 | 2.15E-02 | 1.31E+00 | 1.43E-05 | 1.52E-05 | DA-Event 2 | 1.52E-05 | 5.81E-06 | 7.12E-06 | DA-Event 1 | 5.81E-06 |
| 4-Nitrophenol | 100-02-7 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 2.27E-06 | 2.35E-06 | DA-Event 1 | 2.27E-06 | 9.22E-07 | 1.53E-06 | DA-Event 1 | 9.22E-07 |
| Atrazine | 1912-24-9 | 1 | 5.24E-03 | 1.70E+00 | 2.96E-02 | 4.07E+00 | 2.67E-05 | 2.85E-05 | DA-Event 1 | 2.67E-05 | 1.08E-05 | 2.00E-05 | DA-Event 1 | 1.08E-05 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1 | 1.78E-03 | 6.65E-01 | 8.19E-03 | 1.60E+00 | 5.67E-06 | 5.92E-06 | DA-Event 2 | 5.92E-06 | 2.30E-06 | 2.97E-06 | DA-Event 1 | 2.30E-06 |
| Dibenzofuran | 132-64-9 | 1 | 9.75E-02 | 9.20E-01 | 4.86E-01 | 2.21E+00 | 3.66E-04 | 3.88E-04 | DA-Event 1 | 3.66E-04 | 1.48E-04 | 2.79E-04 | DA-Event 1 | 1.48E-04 |
| Hexachlorocyclopentadiene | 77-47-4 | 0.9 | 1.03E-01 | 3.54E+00 | 6.54E-01 | 1.39E+01 | 6.82E-04 | 1.13E-03 | DA-Event 1 | 6.82E-04 | 2.77E-04 | 1.04E-03 | DA-Event 1 | 2.77E-04 |
| Hexachloroethane | 67-72-1 | 1 | 4.15E-02 | 2.23E+00 | 2.46E-01 | 5.34E+00 | 2.42E-04 | 2.95E-04 | DA-Event 1 | 2.42E-04 | 9.83E-05 | 2.39E-04 | DA-Event 1 | 9.83E-05 |

Table A4-8
Dermal Worksheet for Groundwater (CTE: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Construction Worker - Groundwater (Trench) | | | | On-Site Hypothetical Resident (Adult) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 2 | Selected DA-event | | t-event (hrs/event): | 0.33 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) |
| n-Nitrosodi-n-propylamine | 621-64-7 | 1 | 2.33E-03 | 5.64E-01 | 1.02E-02 | 1.35E+00 | 6.84E-06 | 7.27E-06 | DA-Event 2 | 7.27E-06 | 2.78E-06 | 3.41E-06 | DA-Event 1 | 2.78E-06 |
| Nitrobenzene | 98-95-3 | 1 | 5.41E-03 | 5.14E-01 | 2.31E-02 | 1.23E+00 | 1.52E-05 | 1.63E-05 | DA-Event 2 | 1.63E-05 | 6.16E-06 | 7.44E-06 | DA-Event 1 | 6.16E-06 |
| Pentachlorophenol | 87-86-5 | 0.9 | 1.27E-01 | 3.26E+00 | 7.97E-01 | 1.25E+01 | 8.07E-04 | 1.35E-03 | DA-Event 1 | 8.07E-04 | 3.28E-04 | 1.24E-03 | DA-Event 1 | 3.28E-04 |
| Pesticides | | | | | | | | | | | | | | |
| Dieldrin | 60-57-1 | 0.8 | 3.26E-02 | 1.43E+01 | 2.45E-01 | 3.43E+01 | 3.85E-04 | 9.62E-04 | DA-Event 1 | 3.85E-04 | 1.57E-04 | 9.27E-04 | DA-Event 1 | 1.57E-04 |
| Heptachlor | 76-44-8 | 0.8 | 1.43E-01 | 1.30E+01 | 1.06E+00 | 5.01E+01 | 1.61E-03 | 5.39E-03 | DA-Event 1 | 1.61E-03 | 6.54E-04 | 5.30E-03 | DA-Event 1 | 6.54E-04 |
| Heptachlor epoxide | 1024-57-3 | 0.8 | 2.09E-02 | 1.59E+01 | 1.59E-01 | 3.82E+01 | 2.61E-04 | 6.44E-04 | DA-Event 1 | 2.61E-04 | 1.06E-04 | 6.20E-04 | DA-Event 1 | 1.06E-04 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 7.19E-04 | 8.59E-04 | DA-Event 1 | 7.19E-04 | 2.92E-04 | 7.10E-04 | DA-Event 1 | 2.92E-04 |
| Aroclor 1232 | 11141-16-5 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 7.19E-04 | 8.59E-04 | DA-Event 1 | 7.19E-04 | 2.92E-04 | 7.10E-04 | DA-Event 1 | 2.92E-04 |
| Cyanide | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | 1 | 1.00E-03 | 1.47E-01 | 1.96E-03 | 3.53E-01 | 1.50E-06 | 2.29E-06 | DA-Event 2 | 2.29E-06 | 6.09E-07 | 6.24E-07 | DA-Event 1 | 6.09E-07 |
| Metals (Total) | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 1 | 1.00E-03 | 1.49E-01 | 2.00E-03 | 3.57E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Antimony | 7440-36-0 | 1 | 1.00E-03 | 5.05E-01 | 4.24E-03 | 1.21E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Arsenic | 7440-38-2 | 1 | 1.00E-03 | 2.76E-01 | 3.33E-03 | 6.63E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Barium | 7440-39-3 | 1 | 1.00E-03 | 6.18E-01 | 4.51E-03 | 1.48E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Beryllium | 7440-41-7 | 1 | 1.00E-03 | 1.18E-01 | 1.15E-03 | 2.83E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Cadmium (Water) | 7440-43-9W | 1 | 1.00E-03 | 4.48E-01 | 4.08E-03 | 1.08E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Chromium, Total | 7440-47-3 | 1 | 2.00E-03 | 2.06E-01 | 5.55E-03 | 4.93E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 | 6.60E-07 | -- | DA-Event 1 | 6.60E-07 |
| Cobalt | 7440-48-4 | 1 | 4.00E-04 | 2.25E-01 | 1.18E-03 | 5.40E-01 | 8.00E-07 | -- | DA-Event 1 | 8.00E-07 | 1.32E-07 | -- | DA-Event 1 | 1.32E-07 |
| Iron | 7439-89-6 | 1 | 1.00E-03 | 2.16E-01 | 2.87E-03 | 5.19E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Manganese | 7439-96-5 | 1 | 1.00E-03 | 2.14E-01 | 2.85E-03 | 5.13E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Mercury | 7439-97-6 | 1 | 1.00E-03 | 3.49E+00 | 6.34E-03 | 8.36E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Nickel | 7440-02-0 | 1 | 2.00E-04 | 2.24E-01 | 5.89E-04 | 5.38E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 6.60E-08 | -- | DA-Event 1 | 6.60E-08 |
| Selenium | 7782-49-2 | 1 | 1.00E-03 | 2.91E-01 | 3.42E-03 | 6.99E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Silver | 7440-22-4 | 1 | 6.00E-04 | 4.23E-01 | 2.40E-03 | 1.01E+00 | 1.20E-06 | -- | DA-Event 1 | 1.20E-06 | 1.98E-07 | -- | DA-Event 1 | 1.98E-07 |
| Thallium | 7440-28-0 | 1 | 1.00E-03 | 1.47E+00 | 5.50E-03 | 3.52E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Vanadium | 7440-62-2 | 1 | 1.00E-03 | 2.03E-01 | 2.75E-03 | 4.87E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 | 3.30E-07 | -- | DA-Event 1 | 3.30E-07 |
| Zinc | 7440-66-6 | 1 | 6.00E-04 | 2.44E-01 | 1.87E-03 | 5.86E-01 | 1.20E-06 | -- | DA-Event 1 | 1.20E-06 | 1.98E-07 | -- | DA-Event 1 | 1.98E-07 |

Parameters:
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
CF3 = Conversion Factor 3, 0.001 L/cm3
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T* = Time to Reach Steady-State
t-event = Event Duration (scenario-specific)
Tau-event = Lag Time per Event
DABS = Dermal Absorption Factor

References:
USEPA, 2004. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Final, July, EPA/540/R/99/005.

For Organic Compounds:
If t-event ≤ T*, then: DA-event 1 =

$$2\ x\ FA\ x\ K_p\ x\ CF3\ x\ \sqrt{\frac{6\ x\ \tau_{event}\ x\ t_{event}}{\pi}}$$

If t-event > T*, then: DA-event 2 =

$$FA\ x\ CF3\ x\ K_p\ x\ \left[\frac{t_{event}}{1+B} + (2\ x\ \tau_{event})\ x\ \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

For Inorganic Compounds:
DA-event 1 = KP x CF3 x t-event
No DA-event 2 equation for inorganics.

Table A4-8
Dermal Worksheet for Groundwater (CTE: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: USEPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Hypothetical Resident (Child) - Groundwater (Potable Use) | | | | On-Site Hypothetical Resident (Lifetime) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 0.40 | Selected DA-event | | t-event (hrs/event): | 0.35 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 6.94E-03 | 9.16E-01 | 3.46E-02 | 2.20E+00 | 1.16E-05 | 1.58E-05 | DA-Event 1 | 1.16E-05 | 1.08E-05 | 1.55E-05 | DA-Event 1 | 1.08E-05 |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 5.04E-03 | 5.87E-01 | 2.24E-02 | 1.41E+00 | 6.75E-06 | 8.03E-06 | DA-Event 1 | 6.75E-06 | 6.28E-06 | 7.76E-06 | DA-Event 1 | 6.28E-06 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1 | 7.05E-02 | 1.09E+00 | 3.65E-01 | 2.62E+00 | 1.29E-04 | 2.27E-04 | DA-Event 1 | 1.29E-04 | 1.20E-04 | 2.24E-04 | DA-Event 1 | 1.20E-04 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1 | 6.85E-03 | 2.21E+00 | 4.05E-02 | 5.32E+00 | 1.78E-05 | 3.42E-05 | DA-Event 1 | 1.78E-05 | 1.66E-05 | 3.38E-05 | DA-Event 1 | 1.66E-05 |
| 1,2-Dibromoethane | 106-93-4 | 1 | 2.78E-03 | 1.19E+00 | 1.47E-02 | 2.84E+00 | 5.29E-06 | 7.78E-06 | DA-Event 1 | 5.29E-06 | 4.92E-06 | 7.64E-06 | DA-Event 1 | 4.92E-06 |
| 1,2-Dichloroethane | 107-06-2 | 1 | 4.20E-03 | 3.77E-01 | 1.61E-02 | 9.04E-01 | 4.51E-06 | 4.87E-06 | DA-Event 1 | 4.51E-06 | 4.19E-06 | 4.65E-06 | DA-Event 1 | 4.19E-06 |
| 1,2-Dichloropropane | 78-87-5 | 1 | 7.53E-03 | 4.51E-01 | 3.08E-02 | 1.08E+00 | 8.84E-06 | 9.93E-06 | DA-Event 1 | 8.84E-06 | 8.23E-06 | 9.54E-06 | DA-Event 1 | 8.23E-06 |
| 1,4-Dichlorobenzene | 106-46-7 | 1 | 4.53E-02 | 7.00E-01 | 2.11E-01 | 1.68E+00 | 6.62E-05 | 9.14E-05 | DA-Event 1 | 6.62E-05 | 6.16E-05 | 8.93E-05 | DA-Event 1 | 6.16E-05 |
| 2-Hexanone | 591-78-6 | 1 | 3.55E-03 | 3.83E-01 | 1.37E-02 | 9.18E-01 | 3.84E-06 | 4.15E-06 | DA-Event 1 | 3.84E-06 | 3.57E-06 | 3.97E-06 | DA-Event 1 | 3.57E-06 |
| Benzene | 71-43-2 | 1 | 1.49E-02 | 2.88E-01 | 5.07E-02 | 6.91E-01 | 1.40E-05 | 1.47E-05 | DA-Event 1 | 1.40E-05 | 1.30E-05 | 1.39E-05 | DA-Event 1 | 1.30E-05 |
| Bromodichloromethane | 75-27-4 | 1 | 4.02E-03 | 8.70E-01 | 1.98E-02 | 2.09E+00 | 6.55E-06 | 8.71E-06 | DA-Event 1 | 6.55E-06 | 6.10E-06 | 8.49E-06 | DA-Event 1 | 6.10E-06 |
| Bromoform | 75-25-2 | 1 | 2.35E-03 | 2.74E+00 | 1.44E-02 | 6.57E+00 | 6.80E-06 | 1.40E-05 | DA-Event 1 | 6.80E-06 | 6.32E-06 | 1.38E-05 | DA-Event 1 | 6.32E-06 |
| Bromomethane | 74-83-9 | 1 | 2.84E-03 | 3.58E-01 | 1.06E-02 | 8.58E-01 | 2.97E-06 | 3.18E-06 | DA-Event 1 | 2.97E-06 | 2.76E-06 | 3.03E-06 | DA-Event 1 | 2.76E-06 |
| Carbon Tetrachloride | 56-23-5 | 1 | 1.63E-02 | 7.64E-01 | 7.78E-02 | 1.83E+00 | 2.49E-05 | 3.29E-05 | DA-Event 1 | 2.49E-05 | 2.32E-05 | 3.21E-05 | DA-Event 1 | 2.32E-05 |
| Chloroform | 67-66-3 | 1 | 6.83E-03 | 4.90E-01 | 2.87E-02 | 1.18E+00 | 8.36E-06 | 9.54E-06 | DA-Event 1 | 8.36E-06 | 7.78E-06 | 9.19E-06 | DA-Event 1 | 7.78E-06 |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 1.10E-02 | 3.67E-01 | 4.17E-02 | 8.81E-01 | 1.16E-05 | 1.26E-05 | DA-Event 1 | 1.16E-05 | 1.08E-05 | 1.21E-05 | DA-Event 1 | 1.08E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 9.67E-06 | 1.08E-05 | DA-Event 1 | 9.67E-06 | 8.99E-06 | 1.04E-05 | DA-Event 1 | 8.99E-06 |
| Dibromochloromethane | 124-48-1 | 1 | 2.89E-03 | 1.54E+00 | 1.60E-02 | 3.70E+00 | 6.27E-06 | 1.02E-05 | DA-Event 1 | 6.27E-06 | 5.84E-06 | 1.00E-05 | DA-Event 1 | 5.84E-06 |
| Ethylbenzene | 100-41-4 | 1 | 4.93E-02 | 4.13E-01 | 1.95E-01 | 9.92E-01 | 5.54E-05 | 6.50E-05 | DA-Event 1 | 5.54E-05 | 5.15E-05 | 6.28E-05 | DA-Event 1 | 5.15E-05 |
| Hexachlorobutadiene | 87-68-3 | 0.9 | 8.10E-02 | 3.03E+00 | 5.03E-01 | 7.28E+00 | 2.22E-04 | 6.59E-04 | DA-Event 1 | 2.22E-04 | 2.07E-04 | 6.57E-04 | DA-Event 1 | 2.07E-04 |
| Isopropylbenzene | 98-82-8 | 1 | 8.97E-02 | 4.95E-01 | 3.78E-01 | 1.19E+00 | 1.10E-04 | 1.46E-04 | DA-Event 1 | 1.10E-04 | 1.03E-04 | 1.42E-04 | DA-Event 1 | 1.03E-04 |
| Naphthalene | 91-20-3 | 1 | 4.66E-02 | 5.49E-01 | 2.03E-01 | 1.32E+00 | 6.04E-05 | 7.68E-05 | DA-Event 1 | 6.04E-05 | 5.62E-05 | 7.47E-05 | DA-Event 1 | 5.62E-05 |
| Tetrachloroethene | 127-18-4 | 1 | 3.34E-02 | 8.92E-01 | 1.65E-01 | 2.14E+00 | 5.52E-05 | 8.07E-05 | DA-Event 1 | 5.52E-05 | 5.13E-05 | 7.92E-05 | DA-Event 1 | 5.13E-05 |
| Toluene | 108-88-3 | 1 | 3.11E-02 | 3.45E-01 | 1.15E-01 | 8.28E-01 | 3.19E-05 | 3.51E-05 | DA-Event 1 | 3.19E-05 | 2.97E-05 | 3.36E-05 | DA-Event 1 | 2.97E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 9.67E-06 | 1.08E-05 | DA-Event 1 | 9.67E-06 | 8.99E-06 | 1.04E-05 | DA-Event 1 | 8.99E-06 |
| Trichloroethene | 79-01-6 | 1 | 1.16E-02 | 5.72E-01 | 5.11E-02 | 1.37E+00 | 1.53E-05 | 1.84E-05 | DA-Event 1 | 1.53E-05 | 1.43E-05 | 1.78E-05 | DA-Event 1 | 1.43E-05 |
| Vinyl Chloride | 75-01-4 | 1 | 8.38E-03 | 2.35E-01 | 2.55E-02 | 5.65E-01 | 7.11E-06 | 7.31E-06 | DA-Event 1 | 7.11E-06 | 6.61E-06 | 6.87E-06 | DA-Event 1 | 6.61E-06 |
| Xylenes, Total | 1330-20-7 | 1 | 5.00E-02 | 4.13E-01 | 1.98E-01 | 9.92E-01 | 5.62E-05 | 6.60E-05 | DA-Event 1 | 5.62E-05 | 5.23E-05 | 6.38E-05 | DA-Event 1 | 5.23E-05 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1 | 9.43E-02 | 7.68E-01 | 4.50E-01 | 1.84E+00 | 1.44E-04 | 2.30E-04 | DA-Event 1 | 1.44E-04 | 1.34E-04 | 2.26E-04 | DA-Event 1 | 1.34E-04 |
| 2,4,6-Trichlorophenol | 88-06-2 | 1 | 3.46E-02 | 1.34E+00 | 1.87E-01 | 3.22E+00 | 7.01E-05 | 1.21E-04 | DA-Event 1 | 7.01E-05 | 6.52E-05 | 1.20E-04 | DA-Event 1 | 6.52E-05 |
| 2,4-Dinitrotoluene | 121-14-2 | 1 | 3.08E-03 | 1.10E+00 | 1.60E-02 | 2.64E+00 | 5.65E-06 | 8.10E-06 | DA-Event 1 | 5.65E-06 | 5.26E-06 | 7.94E-06 | DA-Event 1 | 5.26E-06 |
| 2,6-Dinitrotoluene | 606-20-2 | 1 | 3.70E-03 | 1.10E+00 | 1.92E-02 | 2.64E+00 | 6.79E-06 | 9.76E-06 | DA-Event 1 | 6.79E-06 | 6.31E-06 | 9.56E-06 | DA-Event 1 | 6.31E-06 |
| 2-Methylnaphthalene | 91-57-6 | 1 | 9.17E-02 | 6.58E-01 | 4.21E-01 | 1.58E+00 | 1.30E-04 | 1.93E-04 | DA-Event 1 | 1.30E-04 | 1.21E-04 | 1.89E-04 | DA-Event 1 | 1.21E-04 |
| 2-Nitrophenol | 88-75-5 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 1.02E-06 | 1.56E-06 | DA-Event 1 | 1.02E-06 | 9.44E-07 | 1.53E-06 | DA-Event 1 | 9.44E-07 |
| 3,3-Dichlorobenzidine | 91-94-1 | 1 | 1.28E-02 | 2.75E+00 | 7.83E-02 | 6.60E+00 | 3.71E-05 | 8.06E-05 | DA-Event 1 | 3.71E-05 | 3.45E-05 | 8.00E-05 | DA-Event 1 | 3.45E-05 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 1 | 3.15E-03 | 1.35E+00 | 1.71E-02 | 3.25E+00 | 6.41E-06 | 9.91E-06 | DA-Event 1 | 6.41E-06 | 5.96E-06 | 9.74E-06 | DA-Event 1 | 5.96E-06 |
| 4-Chloroaniline | 106-47-8 | 1 | 4.96E-03 | 5.45E-01 | 2.15E-02 | 1.31E+00 | 6.40E-06 | 7.46E-06 | DA-Event 1 | 6.40E-06 | 5.95E-06 | 7.20E-06 | DA-Event 1 | 5.95E-06 |
| 4-Nitrophenol | 100-02-7 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 1.02E-06 | 1.56E-06 | DA-Event 1 | 1.02E-06 | 9.44E-07 | 1.53E-06 | DA-Event 1 | 9.44E-07 |
| Atrazine | 1912-24-9 | 1 | 5.24E-03 | 1.70E+00 | 2.96E-02 | 4.07E+00 | 1.19E-05 | 2.03E-05 | DA-Event 1 | 1.19E-05 | 1.11E-05 | 2.01E-05 | DA-Event 1 | 1.11E-05 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1 | 1.78E-03 | 6.65E-01 | 8.19E-03 | 1.60E+00 | 2.54E-06 | 3.09E-06 | DA-Event 1 | 2.54E-06 | 2.36E-06 | 3.00E-06 | DA-Event 1 | 2.36E-06 |
| Dibenzofuran | 132-64-9 | 1 | 9.75E-02 | 9.20E-01 | 4.86E-01 | 2.21E+00 | 1.63E-04 | 2.84E-04 | DA-Event 1 | 1.63E-04 | 1.52E-04 | 2.80E-04 | DA-Event 1 | 1.52E-04 |
| Hexachlorocyclopentadiene | 77-47-4 | 0.9 | 1.03E-01 | 3.54E+00 | 6.54E-01 | 1.39E+01 | 3.05E-04 | 1.04E-03 | DA-Event 1 | 3.05E-04 | 2.84E-04 | 1.04E-03 | DA-Event 1 | 2.84E-04 |
| Hexachloroethane | 67-72-1 | 1 | 4.15E-02 | 2.23E+00 | 2.46E-01 | 5.34E+00 | 1.08E-04 | 2.42E-04 | DA-Event 1 | 1.08E-04 | 1.01E-04 | 2.40E-04 | DA-Event 1 | 1.01E-04 |

Table A4-8
Dermal Worksheet for Groundwater (CTE: Trench and Potable Use)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Chemical of Potential Concern | CASRN | Source: USEPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Hypothetical Resident (Child) - Groundwater (Potable Use) | | | | On-Site Hypothetical Resident (Lifetime) - Groundwater (Potable Use) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 0.40 | Selected DA-event | | t-event (hrs/event): | 0.35 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | ($L/cm^2$-event) | ($L/cm^2$-event) | | ($L/cm^2$-event) | ($L/cm^2$-event) | ($L/cm^2$-event) | | ($L/cm^2$-event) |
| n-Nitrosodi-n-propylamine | 621-64-7 | 1 | 2.33E-03 | 5.64E-01 | 1.02E-02 | 1.35E+00 | 3.06E-06 | 3.58E-06 | DA-Event 1 | 3.06E-06 | 2.84E-06 | 3.45E-06 | DA-Event 1 | 2.84E-06 |
| Nitrobenzene | 98-95-3 | 1 | 5.41E-03 | 5.14E-01 | 2.31E-02 | 1.23E+00 | 6.78E-06 | 7.81E-06 | DA-Event 1 | 6.78E-06 | 6.31E-06 | 7.52E-06 | DA-Event 1 | 6.31E-06 |
| Pentachlorophenol | 87-86-5 | 0.9 | 1.27E-01 | 3.26E+00 | 7.97E-01 | 1.25E+01 | 3.61E-04 | 1.25E-03 | DA-Event 1 | 3.61E-04 | 3.36E-04 | 1.24E-03 | DA-Event 1 | 3.36E-04 |
| Pesticides | | | | | | | | | | | | | | |
| Dieldrin | 60-57-1 | 0.8 | 3.26E-02 | 1.43E+01 | 2.45E-01 | 3.43E+01 | 1.72E-04 | 9.29E-04 | DA-Event 1 | 1.72E-04 | 1.60E-04 | 9.28E-04 | DA-Event 1 | 1.60E-04 |
| Heptachlor | 76-44-8 | 0.8 | 1.43E-01 | 1.30E+01 | 1.06E+00 | 5.01E+01 | 7.20E-04 | 5.30E-03 | DA-Event 1 | 7.20E-04 | 6.70E-04 | 5.30E-03 | DA-Event 1 | 6.70E-04 |
| Heptachlor epoxide | 1024-57-3 | 0.8 | 2.09E-02 | 1.59E+01 | 1.59E-01 | 3.82E+01 | 1.17E-04 | 6.21E-04 | DA-Event 1 | 1.17E-04 | 1.08E-04 | 6.20E-04 | DA-Event 1 | 1.08E-04 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 3.21E-04 | 7.16E-04 | DA-Event 1 | 3.21E-04 | 2.99E-04 | 7.11E-04 | DA-Event 1 | 2.99E-04 |
| Aroclor 1232 | 11141-16-5 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 3.21E-04 | 7.16E-04 | DA-Event 1 | 3.21E-04 | 2.99E-04 | 7.11E-04 | DA-Event 1 | 2.99E-04 |
| Cyanide | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | 1 | 1.00E-03 | 1.47E-01 | 1.96E-03 | 3.53E-01 | 6.70E-07 | 6.94E-07 | DA-Event 2 | 6.94E-07 | 6.24E-07 | 6.40E-07 | DA-Event 1 | 6.24E-07 |
| Metals (Total) | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 1 | 1.00E-03 | 1.49E-01 | 2.00E-03 | 3.57E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Antimony | 7440-36-0 | 1 | 1.00E-03 | 5.05E-01 | 4.24E-03 | 1.21E+00 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Arsenic | 7440-38-2 | 1 | 1.00E-03 | 2.76E-01 | 3.33E-03 | 6.63E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Barium | 7440-39-3 | 1 | 1.00E-03 | 6.18E-01 | 4.51E-03 | 1.48E+00 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Beryllium | 7440-41-7 | 1 | 1.00E-03 | 1.18E-01 | 1.15E-03 | 2.83E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Cadmium (Water) | 7440-43-9W | 1 | 1.00E-03 | 4.48E-01 | 4.08E-03 | 1.08E+00 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Chromium, Total | 7440-47-3 | 1 | 2.00E-03 | 2.06E-01 | 5.55E-03 | 4.93E-01 | 8.00E-07 | -- | DA-Event 1 | 8.00E-07 | 6.92E-07 | -- | DA-Event 1 | 6.92E-07 |
| Cobalt | 7440-48-4 | 1 | 4.00E-04 | 2.25E-01 | 1.18E-03 | 5.40E-01 | 1.60E-07 | -- | DA-Event 1 | 1.60E-07 | 1.38E-07 | -- | DA-Event 1 | 1.38E-07 |
| Iron | 7439-89-6 | 1 | 1.00E-03 | 2.16E-01 | 2.87E-03 | 5.19E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Manganese | 7439-96-5 | 1 | 1.00E-03 | 2.14E-01 | 2.85E-03 | 5.13E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Mercury | 7439-97-6 | 1 | 1.00E-03 | 3.49E+00 | 6.34E-03 | 8.36E+00 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Nickel | 7440-02-0 | 1 | 2.00E-04 | 2.24E-01 | 5.89E-04 | 5.38E-01 | 8.00E-08 | -- | DA-Event 1 | 8.00E-08 | 6.92E-08 | -- | DA-Event 1 | 6.92E-08 |
| Selenium | 7782-49-2 | 1 | 1.00E-03 | 2.91E-01 | 3.42E-03 | 6.99E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Silver | 7440-22-4 | 1 | 6.00E-04 | 4.23E-01 | 2.40E-03 | 1.01E+00 | 2.40E-07 | -- | DA-Event 1 | 2.40E-07 | 2.08E-07 | -- | DA-Event 1 | 2.08E-07 |
| Thallium | 7440-28-0 | 1 | 1.00E-03 | 1.47E+00 | 5.50E-03 | 3.52E+00 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Vanadium | 7440-62-2 | 1 | 1.00E-03 | 2.03E-01 | 2.75E-03 | 4.87E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 | 3.46E-07 | -- | DA-Event 1 | 3.46E-07 |
| Zinc | 7440-66-6 | 1 | 6.00E-04 | 2.44E-01 | 1.87E-03 | 5.86E-01 | 2.40E-07 | -- | DA-Event 1 | 2.40E-07 | 2.08E-07 | -- | DA-Event 1 | 2.08E-07 |

Parameters:
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
CF3 = Conversion Factor 3, 0.001 L/cm3
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T* = Time to Reach Steady-State
t-event = Event Duration (scenario-specific)
Tau-event = Lag Time per Event
DABS = Dermal Absorption Factor

References:
USEPA, 2004. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Final, July, EPA/540/R/99/005.

For Organic Compounds:
If t-event ≤ T*, then: DA-event 1 =

$$2\ x\ FA\ x\ K_p\ x\ CF3\ x\ \sqrt{\frac{6\ x\ \tau_{event}\ x\ t_{event}}{\pi}}$$

If t-event > T*, then: DA-event 2 =

$$FA\ x\ CF3\ x\ K_p\ x\ \left[\frac{t_{event}}{1+B} + (2\ x\ \tau_{event})\ x\ \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

For Inorganic Compounds:
DA-event 1 = KP x CF3 x t-event
No DA-event 2 equation for inorganics.

Table A4-9
Dermal Worksheet for Surface Water, RME
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Surface Water Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Teen Trepasser, Recreator (Child/Adult/Lifetime), and Hypothetical Resident (Child/Adult/Lifetime) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 2 | Selected DA-event | |
| | | FA<br>unitless | Kp<br>cm/hr | Tau-event<br>hrs/event | B<br>Value | T*<br>hr | DA-Event 1<br>(L/cm$^2$-event) | DA-Event 2<br>(L/cm$^2$-event) | Equation | DA-event<br>(L/cm$^2$-event) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 6.94E-03 | 9.16E-01 | 3.46E-02 | 2.20E+00 | 2.60E-05 | 2.66E-05 | DA-Event 1 | 2.60E-05 |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 5.04E-03 | 5.87E-01 | 2.24E-02 | 1.41E+00 | 1.51E-05 | 1.59E-05 | DA-Event 2 | 1.59E-05 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1 | 7.05E-02 | 1.09E+00 | 3.65E-01 | 2.62E+00 | 2.88E-04 | 3.09E-04 | DA-Event 1 | 2.88E-04 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1 | 6.85E-03 | 2.21E+00 | 4.05E-02 | 5.32E+00 | 3.98E-05 | 4.47E-05 | DA-Event 1 | 3.98E-05 |
| 1,2-Dibromoethane | 106-93-4 | 1 | 2.78E-03 | 1.19E+00 | 1.47E-02 | 2.84E+00 | 1.18E-05 | 1.22E-05 | DA-Event 1 | 1.18E-05 |
| 1,2-Dichloroethane | 107-06-2 | 1 | 4.20E-03 | 3.77E-01 | 1.61E-02 | 9.04E-01 | 1.01E-05 | 1.15E-05 | DA-Event 2 | 1.15E-05 |
| 1,2-Dichloropropane | 78-87-5 | 1 | 7.53E-03 | 4.51E-01 | 3.08E-02 | 1.08E+00 | 1.98E-05 | 2.16E-05 | DA-Event 2 | 2.16E-05 |
| 1,4-Dichlorobenzene | 106-46-7 | 1 | 4.53E-02 | 7.00E-01 | 2.11E-01 | 1.68E+00 | 1.48E-04 | 1.51E-04 | DA-Event 2 | 1.51E-04 |
| 2-Hexanone | 591-78-6 | 1 | 3.55E-03 | 3.83E-01 | 1.37E-02 | 9.18E-01 | 8.58E-06 | 9.76E-06 | DA-Event 2 | 9.76E-06 |
| Benzene | 71-43-2 | 1 | 1.49E-02 | 2.88E-01 | 5.07E-02 | 6.91E-01 | 3.13E-05 | 3.74E-05 | DA-Event 2 | 3.74E-05 |
| Bromodichloromethane | 75-27-4 | 1 | 4.02E-03 | 8.70E-01 | 1.98E-02 | 2.09E+00 | 1.47E-05 | 1.50E-05 | DA-Event 1 | 1.47E-05 |
| Bromoform | 75-25-2 | 1 | 2.35E-03 | 2.74E+00 | 1.44E-02 | 6.57E+00 | 1.52E-05 | 1.77E-05 | DA-Event 1 | 1.52E-05 |
| Bromomethane | 74-83-9 | 1 | 2.84E-03 | 3.58E-01 | 1.06E-02 | 8.58E-01 | 6.64E-06 | 7.67E-06 | DA-Event 2 | 7.67E-06 |
| Carbon Tetrachloride | 56-23-5 | 1 | 1.63E-02 | 7.64E-01 | 7.78E-02 | 1.83E+00 | 5.57E-05 | 5.71E-05 | DA-Event 2 | 5.71E-05 |
| Chloroform | 67-66-3 | 1 | 6.83E-03 | 4.90E-01 | 2.87E-02 | 1.18E+00 | 1.87E-05 | 2.02E-05 | DA-Event 2 | 2.02E-05 |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 1.10E-02 | 3.67E-01 | 4.17E-02 | 8.81E-01 | 2.60E-05 | 2.95E-05 | DA-Event 2 | 2.95E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 2.16E-05 | 2.37E-05 | DA-Event 2 | 2.37E-05 |
| Dibromochloromethane | 124-48-1 | 1 | 2.89E-03 | 1.54E+00 | 1.60E-02 | 3.70E+00 | 1.40E-05 | 1.47E-05 | DA-Event 1 | 1.40E-05 |
| Ethylbenzene | 100-41-4 | 1 | 4.93E-02 | 4.13E-01 | 1.95E-01 | 9.92E-01 | 1.24E-04 | 1.31E-04 | DA-Event 2 | 1.31E-04 |
| Hexachlorobutadiene | 87-68-3 | 0.9 | 8.10E-02 | 3.03E+00 | 5.03E-01 | 7.28E+00 | 4.96E-04 | 7.37E-04 | DA-Event 1 | 4.96E-04 |
| Isopropylbenzene | 98-82-8 | 1 | 8.97E-02 | 4.95E-01 | 3.78E-01 | 1.19E+00 | 2.47E-04 | 2.50E-04 | DA-Event 2 | 2.50E-04 |
| Naphthalene | 91-20-3 | 1 | 4.66E-02 | 5.49E-01 | 2.03E-01 | 1.32E+00 | 1.35E-04 | 1.39E-04 | DA-Event 2 | 1.39E-04 |
| Tetrachloroethene | 127-18-4 | 1 | 3.34E-02 | 8.92E-01 | 1.65E-01 | 2.14E+00 | 1.23E-04 | 1.27E-04 | DA-Event 1 | 1.23E-04 |
| Toluene | 108-88-3 | 1 | 3.11E-02 | 3.45E-01 | 1.15E-01 | 8.28E-01 | 7.14E-05 | 7.97E-05 | DA-Event 2 | 7.97E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 2.16E-05 | 2.37E-05 | DA-Event 2 | 2.37E-05 |
| Trichloroethene | 79-01-6 | 1 | 1.16E-02 | 5.72E-01 | 5.11E-02 | 1.37E+00 | 3.43E-05 | 3.60E-05 | DA-Event 2 | 3.60E-05 |
| Vinyl Chloride | 75-01-4 | 1 | 8.38E-03 | 2.35E-01 | 2.55E-02 | 5.65E-01 | 1.59E-05 | 2.04E-05 | DA-Event 2 | 2.04E-05 |
| Xylenes, Total | 1330-20-7 | 1 | 5.00E-02 | 4.13E-01 | 1.98E-01 | 9.92E-01 | 1.26E-04 | 1.33E-04 | DA-Event 2 | 1.33E-04 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1 | 9.43E-02 | 7.68E-01 | 4.50E-01 | 1.84E+00 | 3.23E-04 | 3.34E-04 | DA-Event 2 | 3.34E-04 |
| 2,4,6-Trichlorophenol | 88-06-2 | 1 | 3.46E-02 | 1.34E+00 | 1.87E-01 | 3.22E+00 | 1.57E-04 | 1.68E-04 | DA-Event 1 | 1.57E-04 |
| 2,4-Dinitrotoluene | 121-14-2 | 1 | 3.08E-03 | 1.10E+00 | 1.60E-02 | 2.64E+00 | 1.26E-05 | 1.30E-05 | DA-Event 1 | 1.26E-05 |
| 2,6-Dinitrotoluene | 606-20-2 | 1 | 3.70E-03 | 1.10E+00 | 1.92E-02 | 2.64E+00 | 1.52E-05 | 1.56E-05 | DA-Event 1 | 1.52E-05 |
| 2-Methylnaphthalene | 91-57-6 | 1 | 9.17E-02 | 6.58E-01 | 4.21E-01 | 1.58E+00 | 2.91E-04 | 2.96E-04 | DA-Event 2 | 2.96E-04 |
| 2-Nitrophenol | 88-75-5 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 2.27E-06 | 2.35E-06 | DA-Event 1 | 2.27E-06 |
| 3,3-Dichlorobenzidine | 91-94-1 | 1 | 1.28E-02 | 2.75E+00 | 7.83E-02 | 6.60E+00 | 8.30E-05 | 9.96E-05 | DA-Event 1 | 8.30E-05 |

Table A4-9
Dermal Worksheet for Surface Water, RME
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Surface Water Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Teen Trepasser, Recreator (Child/Adult/Lifetime), and Hypothetical Resident (Child/Adult/Lifetime) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 2 | Selected DA-event | |
| | | FA<br>unitless | Kp<br>cm/hr | Tau-event<br>hrs/event | B<br>Value | T*<br>hr | DA-Event 1<br>(L/cm$^2$-event) | DA-Event 2<br>(L/cm$^2$-event) | Equation | DA-event<br>(L/cm$^2$-event) |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 1 | 3.15E-03 | 1.35E+00 | 1.71E-02 | 3.25E+00 | 1.43E-05 | 1.49E-05 | DA-Event 1 | 1.43E-05 |
| 4-Chloroaniline | 106-47-8 | 1 | 4.96E-03 | 5.45E-01 | 2.15E-02 | 1.31E+00 | 1.43E-05 | 1.52E-05 | DA-Event 2 | 1.52E-05 |
| 4-Nitrophenol | 100-02-7 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 2.27E-06 | 2.35E-06 | DA-Event 1 | 2.27E-06 |
| Atrazine | 1912-24-9 | 1 | 5.24E-03 | 1.70E+00 | 2.96E-02 | 4.07E+00 | 2.67E-05 | 2.85E-05 | DA-Event 1 | 2.67E-05 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1 | 1.78E-03 | 6.65E-01 | 8.19E-03 | 1.60E+00 | 5.67E-06 | 5.92E-06 | DA-Event 2 | 5.92E-06 |
| Dibenzofuran | 132-64-9 | 1 | 9.75E-02 | 9.20E-01 | 4.86E-01 | 2.21E+00 | 3.66E-04 | 3.88E-04 | DA-Event 1 | 3.66E-04 |
| Hexachlorocyclopentadiene | 77-47-4 | 0.9 | 1.03E-01 | 3.54E+00 | 6.54E-01 | 1.39E+01 | 6.82E-04 | 1.13E-03 | DA-Event 1 | 6.82E-04 |
| Hexachloroethane | 67-72-1 | 1 | 4.15E-02 | 2.23E+00 | 2.46E-01 | 5.34E+00 | 2.42E-04 | 2.95E-04 | DA-Event 1 | 2.42E-04 |
| n-Nitrosodi-n-propylamine | 621-64-7 | 1 | 2.33E-03 | 5.64E-01 | 1.02E-02 | 1.35E+00 | 6.84E-06 | 7.27E-06 | DA-Event 2 | 7.27E-06 |
| Nitrobenzene | 98-95-3 | 1 | 5.41E-03 | 5.14E-01 | 2.31E-02 | 1.23E+00 | 1.52E-05 | 1.63E-05 | DA-Event 2 | 1.63E-05 |
| Pentachlorophenol | 87-86-5 | 0.9 | 1.27E-01 | 3.26E+00 | 7.97E-01 | 1.25E+01 | 8.07E-04 | 1.35E-03 | DA-Event 1 | 8.07E-04 |
| Pesticides | | | | | | | | | | |
| Dieldrin | 60-57-1 | 0.8 | 3.26E-02 | 1.43E+01 | 2.45E-01 | 3.43E+01 | 3.85E-04 | 9.62E-04 | DA-Event 1 | 3.85E-04 |
| Heptachlor | 76-44-8 | 0.8 | 1.43E-01 | 1.30E+01 | 1.06E+00 | 5.01E+01 | 1.61E-03 | 5.39E-03 | DA-Event 1 | 1.61E-03 |
| Heptachlor epoxide | 1024-57-3 | 0.8 | 2.09E-02 | 1.59E+01 | 1.59E-01 | 3.82E+01 | 2.61E-04 | 6.44E-04 | DA-Event 1 | 2.61E-04 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 7.19E-04 | 8.59E-04 | DA-Event 1 | 7.19E-04 |
| Aroclor 1232 | 11141-16-5 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 7.19E-04 | 8.59E-04 | DA-Event 1 | 7.19E-04 |
| Cyanide | | | | | | | | | | |
| Cyanide | 57-12-5 | 1 | 1.00E-03 | 1.47E-01 | 1.96E-03 | 3.53E-01 | 1.50E-06 | 2.29E-06 | DA-Event 2 | 2.29E-06 |
| Metals (Total) | | | | | | | | | | |
| Aluminum | 7429-90-5 | 1 | 1.00E-03 | 1.49E-01 | 2.00E-03 | 3.57E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Antimony | 7440-36-0 | 1 | 1.00E-03 | 5.05E-01 | 4.24E-03 | 1.21E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Arsenic | 7440-38-2 | 1 | 1.00E-03 | 2.76E-01 | 3.33E-03 | 6.63E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Barium | 7440-39-3 | 1 | 1.00E-03 | 6.18E-01 | 4.51E-03 | 1.48E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Beryllium | 7440-41-7 | 1 | 1.00E-03 | 1.18E-01 | 1.15E-03 | 2.83E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Cadmium (Water) | 7440-43-9W | 1 | 1.00E-03 | 4.48E-01 | 4.08E-03 | 1.08E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Chromium, Total | 7440-47-3 | 1 | 2.00E-03 | 2.06E-01 | 5.55E-03 | 4.93E-01 | 4.00E-06 | -- | DA-Event 1 | 4.00E-06 |
| Cobalt | 7440-48-4 | 1 | 4.00E-04 | 2.25E-01 | 1.18E-03 | 5.40E-01 | 8.00E-07 | -- | DA-Event 1 | 8.00E-07 |
| Iron | 7439-89-6 | 1 | 1.00E-03 | 2.16E-01 | 2.87E-03 | 5.19E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Manganese | 7439-96-5 | 1 | 1.00E-03 | 2.14E-01 | 2.85E-03 | 5.13E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Mercury | 7439-97-6 | 1 | 1.00E-03 | 3.49E+00 | 6.34E-03 | 8.36E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Nickel | 7440-02-0 | 1 | 2.00E-04 | 2.24E-01 | 5.89E-04 | 5.38E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 |
| Selenium | 7782-49-2 | 1 | 1.00E-03 | 2.91E-01 | 3.42E-03 | 6.99E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Silver | 7440-22-4 | 1 | 6.00E-04 | 4.23E-01 | 2.40E-03 | 1.01E+00 | 1.20E-06 | -- | DA-Event 1 | 1.20E-06 |
| Thallium | 7440-28-0 | 1 | 1.00E-03 | 1.47E+00 | 5.50E-03 | 3.52E+00 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Vanadium | 7440-62-2 | 1 | 1.00E-03 | 2.03E-01 | 2.75E-03 | 4.87E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |

Table A4-9
Dermal Worksheet for Surface Water, RME
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Surface Water Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Teen Trepasser, Recreator (Child/Adult/Lifetime), and Hypothetical Resident (Child/Adult/Lifetime) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 2 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) |
| Zinc | 7440-66-6 | 1 | 6.00E-04 | 2.44E-01 | 1.87E-03 | 5.86E-01 | 1.20E-06 | -- | DA-Event 1 | 1.20E-06 |

Parameters:
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis
CF3 = Conversion Factor 3, 0.001 L/cm3
FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
T* = Time to Reach Steady-State
t-event = Event Duration (scenario-specific)
Tau-event = Lag Time per Event
DABS = Dermal Absorption Factor

References:
USEPA, 2004. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Final, July, EPA/540/R/99/005.

For Organic Compounds:
If t-event ≤ T*, then: DA-event 1 =

$$2\ x\ FA\ x\ K_p\ x\ CF3\ x\ \sqrt{\frac{6\ x\ \tau_{event}\ x\ t_{event}}{\pi}}$$

If t-event > T*, then: DA-event 2 =

$$FA\ x\ CF3\ x\ K_p\ x\ \left[\frac{t_{event}}{1+B} + (2\ x\ \tau_{event})\ x\ \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

For Inorganic Compounds:
DA-event 1 = KP x CF3 x t-event
No DA-event 2 equation for inorganics.

Table A4-10
Dermal Worksheet for Surface Water, CTE
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Surface Water Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Teen Trepasser, Recreator (Child/Adult/Lifetime), and Hypothetical Resident (Child/Adult/Lifetime) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 1 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | ($L/cm^2$-event) | ($L/cm^2$-event) | | ($L/cm^2$-event) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1 | 6.94E-03 | 9.16E-01 | 3.46E-02 | 2.20E+00 | 1.84E-05 | 1.99E-05 | DA-Event 1 | 1.84E-05 |
| 1,1,2-Trichloroethane | 79-00-5 | 1 | 5.04E-03 | 5.87E-01 | 2.24E-02 | 1.41E+00 | 1.07E-05 | 1.10E-05 | DA-Event 1 | 1.07E-05 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1 | 7.05E-02 | 1.09E+00 | 3.65E-01 | 2.62E+00 | 2.04E-04 | 2.58E-04 | DA-Event 1 | 2.04E-04 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 1 | 6.85E-03 | 2.21E+00 | 4.05E-02 | 5.32E+00 | 2.82E-05 | 3.82E-05 | DA-Event 1 | 2.82E-05 |
| 1,2-Dibromoethane | 106-93-4 | 1 | 2.78E-03 | 1.19E+00 | 1.47E-02 | 2.84E+00 | 8.37E-06 | 9.43E-06 | DA-Event 1 | 8.37E-06 |
| 1,2-Dichloroethane | 107-06-2 | 1 | 4.20E-03 | 3.77E-01 | 1.61E-02 | 9.04E-01 | 7.13E-06 | 7.35E-06 | DA-Event 2 | 7.35E-06 |
| 1,2-Dichloropropane | 78-87-5 | 1 | 7.53E-03 | 4.51E-01 | 3.08E-02 | 1.08E+00 | 1.40E-05 | 1.43E-05 | DA-Event 1 | 1.40E-05 |
| 1,4-Dichlorobenzene | 106-46-7 | 1 | 4.53E-02 | 7.00E-01 | 2.11E-01 | 1.68E+00 | 1.05E-04 | 1.14E-04 | DA-Event 1 | 1.05E-04 |
| 2-Hexanone | 591-78-6 | 1 | 3.55E-03 | 3.83E-01 | 1.37E-02 | 9.18E-01 | 6.07E-06 | 6.26E-06 | DA-Event 2 | 6.26E-06 |
| Benzene | 71-43-2 | 1 | 1.49E-02 | 2.88E-01 | 5.07E-02 | 6.91E-01 | 2.21E-05 | 2.32E-05 | DA-Event 2 | 2.32E-05 |
| Bromodichloromethane | 75-27-4 | 1 | 4.02E-03 | 8.70E-01 | 1.98E-02 | 2.09E+00 | 1.04E-05 | 1.11E-05 | DA-Event 1 | 1.04E-05 |
| Bromoform | 75-25-2 | 1 | 2.35E-03 | 2.74E+00 | 1.44E-02 | 6.57E+00 | 1.07E-05 | 1.54E-05 | DA-Event 1 | 1.07E-05 |
| Bromomethane | 74-83-9 | 1 | 2.84E-03 | 3.58E-01 | 1.06E-02 | 8.58E-01 | 4.69E-06 | 4.86E-06 | DA-Event 2 | 4.86E-06 |
| Carbon Tetrachloride | 56-23-5 | 1 | 1.63E-02 | 7.64E-01 | 7.78E-02 | 1.83E+00 | 3.94E-05 | 4.20E-05 | DA-Event 1 | 3.94E-05 |
| Chloroform | 67-66-3 | 1 | 6.83E-03 | 4.90E-01 | 2.87E-02 | 1.18E+00 | 1.32E-05 | 1.35E-05 | DA-Event 1 | 1.32E-05 |
| cis-1,2-Dichloroethene | 156-59-2 | 1 | 1.10E-02 | 3.67E-01 | 4.17E-02 | 8.81E-01 | 1.84E-05 | 1.90E-05 | DA-Event 2 | 1.90E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 1.53E-05 | 1.57E-05 | DA-Event 1 | 1.53E-05 |
| Dibromochloromethane | 124-48-1 | 1 | 2.89E-03 | 1.54E+00 | 1.60E-02 | 3.70E+00 | 9.92E-06 | 1.19E-05 | DA-Event 1 | 9.92E-06 |
| Ethylbenzene | 100-41-4 | 1 | 4.93E-02 | 4.13E-01 | 1.95E-01 | 9.92E-01 | 8.76E-05 | 8.98E-05 | DA-Event 2 | 8.98E-05 |
| Hexachlorobutadiene | 87-68-3 | 0.9 | 8.10E-02 | 3.03E+00 | 5.03E-01 | 7.28E+00 | 3.51E-04 | 6.89E-04 | DA-Event 1 | 3.51E-04 |
| Isopropylbenzene | 98-82-8 | 1 | 8.97E-02 | 4.95E-01 | 3.78E-01 | 1.19E+00 | 1.75E-04 | 1.85E-04 | DA-Event 1 | 1.75E-04 |
| Naphthalene | 91-20-3 | 1 | 4.66E-02 | 5.49E-01 | 2.03E-01 | 1.32E+00 | 9.54E-05 | 1.00E-04 | DA-Event 1 | 9.54E-05 |
| Tetrachloroethene | 127-18-4 | 1 | 3.34E-02 | 8.92E-01 | 1.65E-01 | 2.14E+00 | 8.72E-05 | 9.79E-05 | DA-Event 1 | 8.72E-05 |
| Toluene | 108-88-3 | 1 | 3.11E-02 | 3.45E-01 | 1.15E-01 | 8.28E-01 | 5.05E-05 | 5.18E-05 | DA-Event 2 | 5.18E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1 | 8.34E-03 | 4.40E-01 | 3.38E-02 | 1.06E+00 | 1.53E-05 | 1.57E-05 | DA-Event 1 | 1.53E-05 |
| Trichloroethene | 79-01-6 | 1 | 1.16E-02 | 5.72E-01 | 5.11E-02 | 1.37E+00 | 2.43E-05 | 2.50E-05 | DA-Event 1 | 2.43E-05 |
| Vinyl Chloride | 75-01-4 | 1 | 8.38E-03 | 2.35E-01 | 2.55E-02 | 5.65E-01 | 1.12E-05 | 1.22E-05 | DA-Event 2 | 1.22E-05 |
| Xylenes, Total | 1330-20-7 | 1 | 5.00E-02 | 4.13E-01 | 1.98E-01 | 9.92E-01 | 8.89E-05 | 9.10E-05 | DA-Event 2 | 9.10E-05 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1 | 9.43E-02 | 7.68E-01 | 4.50E-01 | 1.84E+00 | 2.28E-04 | 2.69E-04 | DA-Event 1 | 2.28E-04 |
| 2,4,6-Trichlorophenol | 88-06-2 | 1 | 3.46E-02 | 1.34E+00 | 1.87E-01 | 3.22E+00 | 1.11E-04 | 1.39E-04 | DA-Event 1 | 1.11E-04 |
| 2,4-Dinitrotoluene | 121-14-2 | 1 | 3.08E-03 | 1.10E+00 | 1.60E-02 | 2.64E+00 | 8.93E-06 | 9.92E-06 | DA-Event 1 | 8.93E-06 |
| 2,6-Dinitrotoluene | 606-20-2 | 1 | 3.70E-03 | 1.10E+00 | 1.92E-02 | 2.64E+00 | 1.07E-05 | 1.19E-05 | DA-Event 1 | 1.07E-05 |

Table A4-10
Dermal Worksheet for Surface Water, CTE
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Surface Water Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Teen Trepasser, Recreator (Child/Adult/Lifetime), and Hypothetical Resident (Child/Adult/Lifetime) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 1 | Selected DA-event | |
| | | FA | Kp | Tau-event | B | T* | DA-Event 1 | DA-Event 2 | Equation | DA-event |
| | | unitless | cm/hr | hrs/event | Value | hr | (L/cm$^2$-event) | (L/cm$^2$-event) | | (L/cm$^2$-event) |
| 2-Methylnaphthalene | 91-57-6 | 1 | 9.17E-02 | 6.58E-01 | 4.21E-01 | 1.58E+00 | 2.06E-04 | 2.32E-04 | DA-Event 1 | 2.06E-04 |
| 2-Nitrophenol | 88-75-5 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 1.60E-06 | 1.86E-06 | DA-Event 1 | 1.60E-06 |
| 3,3-Dichlorobenzidine | 91-94-1 | 1 | 1.28E-02 | 2.75E+00 | 7.83E-02 | 6.60E+00 | 5.87E-05 | 8.78E-05 | DA-Event 1 | 5.87E-05 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 1 | 3.15E-03 | 1.35E+00 | 1.71E-02 | 3.25E+00 | 1.01E-05 | 1.18E-05 | DA-Event 1 | 1.01E-05 |
| 4-Chloroaniline | 106-47-8 | 1 | 4.96E-03 | 5.45E-01 | 2.15E-02 | 1.31E+00 | 1.01E-05 | 1.04E-05 | DA-Event 1 | 1.01E-05 |
| 4-Nitrophenol | 100-02-7 | 1 | 4.96E-04 | 1.37E+00 | 2.69E-03 | 3.29E+00 | 1.60E-06 | 1.86E-06 | DA-Event 1 | 1.60E-06 |
| Atrazine | 1912-24-9 | 1 | 5.24E-03 | 1.70E+00 | 2.96E-02 | 4.07E+00 | 1.89E-05 | 2.34E-05 | DA-Event 1 | 1.89E-05 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1 | 1.78E-03 | 6.65E-01 | 8.19E-03 | 1.60E+00 | 4.01E-06 | 4.15E-06 | DA-Event 1 | 4.01E-06 |
| Dibenzofuran | 132-64-9 | 1 | 9.75E-02 | 9.20E-01 | 4.86E-01 | 2.21E+00 | 2.58E-04 | 3.23E-04 | DA-Event 1 | 2.58E-04 |
| Hexachlorocyclopentadiene | 77-47-4 | 0.9 | 1.03E-01 | 3.54E+00 | 6.54E-01 | 1.39E+01 | 4.82E-04 | 1.08E-03 | DA-Event 1 | 4.82E-04 |
| Hexachloroethane | 67-72-1 | 1 | 4.15E-02 | 2.23E+00 | 2.46E-01 | 5.34E+00 | 1.71E-04 | 2.62E-04 | DA-Event 1 | 1.71E-04 |
| n-Nitrosodi-n-propylamine | 621-64-7 | 1 | 2.33E-03 | 5.64E-01 | 1.02E-02 | 1.35E+00 | 4.83E-06 | 4.96E-06 | DA-Event 1 | 4.83E-06 |
| Nitrobenzene | 98-95-3 | 1 | 5.41E-03 | 5.14E-01 | 2.31E-02 | 1.23E+00 | 1.07E-05 | 1.10E-05 | DA-Event 1 | 1.07E-05 |
| Pentachlorophenol | 87-86-5 | 0.9 | 1.27E-01 | 3.26E+00 | 7.97E-01 | 1.25E+01 | 5.70E-04 | 1.29E-03 | DA-Event 1 | 5.70E-04 |
| Pesticides | | | | | | | | | | |
| Dieldrin | 60-57-1 | 0.8 | 3.26E-02 | 1.43E+01 | 2.45E-01 | 3.43E+01 | 2.72E-04 | 9.41E-04 | DA-Event 1 | 2.72E-04 |
| Heptachlor | 76-44-8 | 0.8 | 1.43E-01 | 1.30E+01 | 1.06E+00 | 5.01E+01 | 1.14E-03 | 5.33E-03 | DA-Event 1 | 1.14E-03 |
| Heptachlor epoxide | 1024-57-3 | 0.8 | 2.09E-02 | 1.59E+01 | 1.59E-01 | 3.82E+01 | 1.84E-04 | 6.30E-04 | DA-Event 1 | 1.84E-04 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 5.08E-04 | 7.70E-04 | DA-Event 1 | 5.08E-04 |
| Aroclor 1232 | 11141-16-5 | 1 | 1.68E-01 | 1.20E+00 | 8.88E-01 | 4.60E+00 | 5.08E-04 | 7.70E-04 | DA-Event 1 | 5.08E-04 |
| Cyanide | | | | | | | | | | |
| Cyanide | 57-12-5 | 1 | 1.00E-03 | 1.47E-01 | 1.96E-03 | 3.53E-01 | 1.06E-06 | 1.29E-06 | DA-Event 2 | 1.29E-06 |
| Metals (Total) | | | | | | | | | | |
| Aluminum | 7429-90-5 | 1 | 1.00E-03 | 1.49E-01 | 2.00E-03 | 3.57E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Antimony | 7440-36-0 | 1 | 1.00E-03 | 5.05E-01 | 4.24E-03 | 1.21E+00 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Arsenic | 7440-38-2 | 1 | 1.00E-03 | 2.76E-01 | 3.33E-03 | 6.63E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Barium | 7440-39-3 | 1 | 1.00E-03 | 6.18E-01 | 4.51E-03 | 1.48E+00 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Beryllium | 7440-41-7 | 1 | 1.00E-03 | 1.18E-01 | 1.15E-03 | 2.83E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Cadmium (Water) | 7440-43-9W | 1 | 1.00E-03 | 4.48E-01 | 4.08E-03 | 1.08E+00 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Chromium, Total | 7440-47-3 | 1 | 2.00E-03 | 2.06E-01 | 5.55E-03 | 4.93E-01 | 2.00E-06 | -- | DA-Event 1 | 2.00E-06 |
| Cobalt | 7440-48-4 | 1 | 4.00E-04 | 2.25E-01 | 1.18E-03 | 5.40E-01 | 4.00E-07 | -- | DA-Event 1 | 4.00E-07 |
| Iron | 7439-89-6 | 1 | 1.00E-03 | 2.16E-01 | 2.87E-03 | 5.19E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Manganese | 7439-96-5 | 1 | 1.00E-03 | 2.14E-01 | 2.85E-03 | 5.13E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |

Table A4-10
Dermal Worksheet for Surface Water, CTE
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Surface Water Chemical of Potential Concern | CASRN | Source: EPA, 2004, RAGS Part E Dermal Guidance | | | | | On-Site Teen Trepasser, Recreator (Child/Adult/Lifetime), and Hypothetical Resident (Child/Adult/Lifetime) | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | t-event (hrs/event): | 1 | Selected DA-event | |
| | | FA<br>unitless | Kp<br>cm/hr | Tau-event<br>hrs/event | B<br>Value | T*<br>hr | DA-Event 1<br>(L/cm$^2$-event) | DA-Event 2<br>(L/cm$^2$-event) | Equation | DA-event<br>(L/cm$^2$-event) |
| Mercury | 7439-97-6 | 1 | 1.00E-03 | 3.49E+00 | 6.34E-03 | 8.36E+00 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Nickel | 7440-02-0 | 1 | 2.00E-04 | 2.24E-01 | 5.89E-04 | 5.38E-01 | 2.00E-07 | -- | DA-Event 1 | 2.00E-07 |
| Selenium | 7782-49-2 | 1 | 1.00E-03 | 2.91E-01 | 3.42E-03 | 6.99E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Silver | 7440-22-4 | 1 | 6.00E-04 | 4.23E-01 | 2.40E-03 | 1.01E+00 | 6.00E-07 | -- | DA-Event 1 | 6.00E-07 |
| Thallium | 7440-28-0 | 1 | 1.00E-03 | 1.47E+00 | 5.50E-03 | 3.52E+00 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Vanadium | 7440-62-2 | 1 | 1.00E-03 | 2.03E-01 | 2.75E-03 | 4.87E-01 | 1.00E-06 | -- | DA-Event 1 | 1.00E-06 |
| Zinc | 7440-66-6 | 1 | 6.00E-04 | 2.44E-01 | 1.87E-03 | 5.86E-01 | 6.00E-07 | -- | DA-Event 1 | 6.00E-07 |

Parameters:

B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis

CF3 = Conversion Factor 3, 0.001 L/cm3

FA = Fraction Absorbed Water

Kp = Dermal Permeability Coefficient of Compound in Water

T* = Time to Reach Steady-State

t-event = Event Duration (scenario-specific)

Tau-event = Lag Time per Event

DABS = Dermal Absorption Factor

References:

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Final, July, EPA/540/R/99/005.

For Organic Compounds:

If t-event ≤ T*, then: DA-event 1 =

$$2\ x\ FA\ x\ K_p\ x\ CF3\ x\ \sqrt{\frac{6\ x\ \tau_{event}\ x\ t_{event}}{\pi}}$$

If t-event > T*, then: DA-event 2 =

$$FA\ x\ CF3\ x\ K_p\ x\ \left[\frac{t_{event}}{1+B} + (2\ x\ \tau_{event})\ x\ \left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

For Inorganic Compounds:

DA-event 1 = KP x CF3 x t-event

No DA-event 2 equation for inorganics.

Table A4-11
Calculation of Receptor-Specific Volatilization Factors for the Groundwater-to-Outdoor Air Exposure Pathway
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Volatile Chemical of Potential Concern (Non-Vapor Intrusion) | CASRN | Diffusivity in Air ($D_{air}$) ($cm^2/s$) | Diffusivity in Water ($D_{wat}$) ($cm^2/s$) | Henry's Law Constant at System Temperature ($H'_{TS}$) ($cm^3$-water / $cm^3$-air) | Effective Diffusivities | | | Outdoor Air $VF_{w,amb}$ ($mg/m^3$)-air / (mg/L)-water |
|---|---|---|---|---|---|---|---|---|
| | | | | | $D^{eff}_{cap}$ ($cm^2/s$) | $D^{eff}_{s}$ ($cm^2/s$) | $D^{eff}_{ws}$ ($cm^2/s$) | |
| Volatile Organic Compounds (VOCs) | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 4.89E-02 | 9.29E-06 | 8.42E-03 | 2.21E-04 | 3.82E-03 | 2.49E-03 | 4.59E-06 |
| 1,1,2-Trichloroethane | 79-00-5 | 6.69E-02 | 1.00E-05 | 2.35E-02 | 9.17E-05 | 5.22E-03 | 1.84E-03 | 9.46E-06 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 3.96E-02 | 8.40E-06 | 3.02E-02 | 5.92E-05 | 3.09E-03 | 1.15E-03 | 7.63E-06 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 3.21E-02 | 8.90E-06 | 3.27E-03 | 5.34E-04 | 2.52E-03 | 2.25E-03 | 1.61E-06 |
| 1,2-Dibromoethane | 106-93-4 | 4.30E-02 | 1.04E-05 | 1.62E-02 | 1.31E-04 | 3.36E-03 | 1.86E-03 | 6.59E-06 |
| 1,2-Dichloroethane | 107-06-2 | 8.57E-02 | 1.10E-05 | 2.66E-02 | 9.15E-05 | 6.69E-03 | 1.98E-03 | 1.16E-05 |
| 1,2-Dichloropropane | 78-87-5 | 7.33E-02 | 9.73E-06 | 7.57E-02 | 3.45E-05 | 5.72E-03 | 8.90E-04 | 1.48E-05 |
| 1,4-Dichlorobenzene | 106-46-7 | 5.50E-02 | 8.68E-06 | 5.73E-02 | 3.65E-05 | 4.30E-03 | 8.89E-04 | 1.12E-05 |
| 2-Hexanone | 591-78-6 | 7.04E-02 | 8.44E-06 | 2.32E-03 | 7.18E-04 | 5.51E-03 | 4.52E-03 | 2.29E-06 |
| Benzene | 71-43-2 | 8.95E-02 | 1.03E-05 | 1.54E-01 | 2.45E-05 | 6.99E-03 | 6.75E-04 | 2.28E-05 |
| Bromodichloromethane | 75-27-4 | 5.63E-02 | 1.07E-05 | 4.31E-02 | 5.56E-05 | 4.39E-03 | 1.23E-03 | 1.17E-05 |
| Bromoform | 75-25-2 | 3.57E-02 | 1.04E-05 | 1.28E-02 | 1.61E-04 | 2.79E-03 | 1.82E-03 | 5.12E-06 |
| Bromomethane | 74-83-9 | 1.00E-01 | 1.35E-05 | 1.97E-01 | 2.63E-05 | 7.84E-03 | 7.27E-04 | 3.14E-05 |
| Carbon Tetrachloride | 56-23-5 | 5.71E-02 | 9.78E-06 | 8.58E-01 | 9.60E-06 | 4.46E-03 | 2.74E-04 | 5.16E-05 |
| Chloroform | 67-66-3 | 7.69E-02 | 1.09E-05 | 1.05E-01 | 3.02E-05 | 6.00E-03 | 7.99E-04 | 1.83E-05 |
| cis-1,2-Dichloroethene | 156-59-2 | 8.84E-02 | 1.13E-05 | 1.15E-01 | 3.06E-05 | 6.90E-03 | 8.22E-04 | 2.08E-05 |
| cis-1,3-Dichloropropene | 10061-01-5 | 7.63E-02 | 1.01E-05 | 4.67E-01 | 1.41E-05 | 5.95E-03 | 4.00E-04 | 4.09E-05 |
| Dibromochloromethane | 124-48-1 | 3.66E-02 | 1.06E-05 | 2.33E-02 | 9.30E-05 | 2.86E-03 | 1.45E-03 | 7.37E-06 |
| Ethylbenzene | 100-41-4 | 6.85E-02 | 8.46E-06 | 1.97E-01 | 1.72E-05 | 5.34E-03 | 4.78E-04 | 2.06E-05 |
| Hexachlorobutadiene | 87-68-3 | 2.67E-02 | 7.03E-06 | 1.78E-01 | 1.11E-05 | 2.09E-03 | 2.92E-04 | 1.14E-05 |
| Isopropylbenzene | 98-82-8 | 6.03E-02 | 7.86E-06 | 2.53E-01 | 1.38E-05 | 4.71E-03 | 3.87E-04 | 2.14E-05 |
| Naphthalene | 91-20-3 | 6.05E-02 | 8.38E-06 | 1.05E-02 | 1.64E-04 | 4.73E-03 | 2.47E-03 | 5.65E-06 |
| Tetrachloroethene | 127-18-4 | 5.05E-02 | 9.46E-06 | 4.74E-01 | 1.04E-05 | 3.94E-03 | 2.93E-04 | 3.05E-05 |
| Toluene | 108-88-3 | 7.78E-02 | 9.20E-06 | 1.74E-01 | 2.03E-05 | 6.07E-03 | 5.62E-04 | 2.15E-05 |
| trans-1,3-Dichloropropene | 10061-02-6 | 7.63E-02 | 1.01E-05 | 4.67E-01 | 1.41E-05 | 5.95E-03 | 4.00E-04 | 4.09E-05 |
| Trichloroethene | 79-01-6 | 6.87E-02 | 1.02E-05 | 2.80E-01 | 1.60E-05 | 5.36E-03 | 4.47E-04 | 2.74E-05 |
| Vinyl Chloride | 75-01-4 | 1.07E-01 | 1.20E-05 | 8.84E-01 | 1.65E-05 | 8.36E-03 | 4.73E-04 | 9.18E-05 |
| Xylenes, Total | 1330-20-7 | 6.85E-02 | 8.46E-06 | 1.28E-01 | 2.17E-05 | 5.35E-03 | 5.88E-04 | 1.66E-05 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 4.71E-02 | 7.56E-06 | 6.30E-03 | 2.39E-04 | 3.68E-03 | 2.50E-03 | 3.45E-06 |
| 2-Methylnaphthalene | 91-57-6 | 5.24E-02 | 7.78E-06 | 9.44E-03 | 1.67E-04 | 4.10E-03 | 2.31E-03 | 4.78E-06 |
| Benzo(a)anthracene | 56-55-3 | 2.61E-02 | 6.75E-06 | 4.30E-05 | 3.05E-02 | 2.97E-03 | 3.06E-03 | 2.89E-08 |
| Bis(2-chloroethyl)ether | 111-44-4 | 5.67E-02 | 8.71E-06 | 3.76E-04 | 4.51E-03 | 4.56E-03 | 4.56E-03 | 3.76E-07 |
| Dibenzofuran | 132-64-9 | 6.51E-02 | 7.38E-06 | 2.02E-03 | 7.20E-04 | 5.10E-03 | 4.25E-03 | 1.88E-06 |
| Hexachlorobenzene | 118-74-1 | 2.90E-02 | 7.85E-06 | 1.98E-02 | 8.09E-05 | 2.26E-03 | 1.20E-03 | 5.20E-06 |
| Hexachlorocyclopentadiene | 77-47-4 | 2.72E-02 | 7.22E-06 | 5.46E-01 | 6.09E-06 | 2.13E-03 | 1.71E-04 | 2.04E-05 |

Table A4-11
Calculation of Receptor-Specific Volatilization Factors for the Groundwater-to-Outdoor Air Exposure Pathway
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Volatile Chemical of Potential Concern (Non-Vapor Intrusion) | CASRN | Diffusivity in Air ($D_{air}$) ($cm^2/s$) | Diffusivity in Water ($D_{wat}$) ($cm^2/s$) | Henry's Law Constant at System Temperature ($H'_{TS}$) ($cm^3$-water / $cm^3$-air) | Effective Diffusivities | | | Outdoor Air $VF_{w,amb}$ ($mg/m^3$)-air / (mg/L)-water |
|---|---|---|---|---|---|---|---|---|
| | | | | | $D^{eff}_{cap}$ ($cm^2/s$) | $D^{eff}_{s}$ ($cm^2/s$) | $D^{eff}_{ws}$ ($cm^2/s$) | |
| Hexachloroethane | 67-72-1 | 3.21E-02 | 8.89E-06 | 8.95E-02 | 2.35E-05 | 2.51E-03 | 5.59E-04 | 1.10E-05 |
| Nitrobenzene | 98-95-3 | 6.81E-02 | 9.45E-06 | 5.07E-04 | 3.63E-03 | 5.42E-03 | 5.33E-03 | 5.93E-07 |
| Pesticides | | | | | | | | |
| Aldrin | 309-00-2 | 2.28E-02 | 5.84E-06 | 2.38E-03 | 4.79E-04 | 1.79E-03 | 1.65E-03 | 8.61E-07 |
| Heptachlor | 76-44-8 | 2.23E-02 | 5.70E-06 | 1.78E-02 | 6.51E-05 | 1.75E-03 | 9.44E-04 | 3.68E-06 |
| Heptachlor epoxide | 1024-57-3 | 2.40E-02 | 6.25E-06 | 1.23E-04 | 9.91E-03 | 2.18E-03 | 2.23E-03 | 6.00E-08 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 3.25E-02 | 7.23E-06 | 1.41E-02 | 1.04E-04 | 2.54E-03 | 1.43E-03 | 4.43E-06 |
| Aroclor 1232 | 11141-16-5 | 3.34E-02 | 7.52E-06 | 1.37E-02 | 1.11E-04 | 2.61E-03 | 1.50E-03 | 4.51E-06 |
| Aroclor 1242 | 53469-21-9 | 2.39E-02 | 6.11E-06 | 9.03E-03 | 1.35E-04 | 1.87E-03 | 1.31E-03 | 2.60E-06 |
| Aroclor 1248 | 12672-29-6 | 2.41E-02 | 6.18E-06 | 1.91E-03 | 6.33E-04 | 1.90E-03 | 1.78E-03 | 7.44E-07 |
| Aroclor 1254 | 11097-69-1 | 2.37E-02 | 6.10E-06 | 3.45E-02 | 3.75E-05 | 1.85E-03 | 7.15E-04 | 5.40E-06 |
| Aroclor 1260 | 11096-82-5 | 2.20E-02 | 5.61E-06 | 7.89E-02 | 1.67E-05 | 1.72E-03 | 3.94E-04 | 6.82E-06 |
| Dioxins/Furans | | | | | | | | |
| 2,3,7,8-TCDD TEQ | 2,3,7,8-TCDD TEQ | 4.70E-02 | 6.76E-06 | 5.90E-04 | 2.23E-03 | 3.74E-03 | 3.66E-03 | 4.73E-07 |
| Cyanide | | | | | | | | |
| Cyanide | 57-12-5 | 2.11E-01 | 2.46E-05 | 2.53E-03 | 1.92E-03 | 1.65E-02 | 1.32E-02 | 7.32E-06 |
| Metals (Total) | | | | | | | | |
| Mercury | 7439-97-6 | 3.07E-02 | 6.30E-06 | 1.38E-01 | 1.28E-05 | 2.40E-03 | 3.37E-04 | 1.02E-05 |

Table A4-11
Calculation of Receptor-Specific Volatilization Factors for the Groundwater-to-Outdoor Air Exposure Pathway
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Volatile Chemical of Potential Concern (Non-Vapor Intrusion) | CASRN | Diffusivity in Air ($D_{air}$) ($cm^2/s$) | Diffusivity in Water ($D_{wat}$) ($cm^2/s$) | Henry's Law Constant at System Temperature ($H'_{TS}$) ($cm^3$-water / $cm^3$-air) | Effective Diffusivities | | | Outdoor Air $VF_{w,amb}$ ($mg/m^3$)-air / (mg/L)-water |
|---|---|---|---|---|---|---|---|---|
| | | | | | $D^{eff}_{cap}$ ($cm^2/s$) | $D^{eff}_{s}$ ($cm^2/s$) | $D^{eff}_{ws}$ ($cm^2/s$) | |

Notes:

Equation (1a) $D^{eff}_{cap} = D_{air} \times (\Theta_{acap}^{3.33} / \Theta_t^2) + (D_{wat} / H'_{TS}) \times (\Theta_{wcap}^{3.33} / \Theta_t^2)$
Equation (1b) $D^{eff}_{s} = D_{air} \times (\Theta_{as}^{3.33} / \Theta_t^2) + (D_{wat} / H'_{TS}) \times (\Theta_{ws}^{3.33} / \Theta_t^2)$
Equation (2) $D^{eff}_{ws} = (h_{cap} + h_v) \times ((h_{cap} / D^{eff}_{cap}) + (h_v / D^{eff}_{s}))^{-1}$
Equation (3) $VF_{w,amb} = H'_{TS} / (1 + (U_{air} \times \delta_{air} \times L_{gw} / (W \times D^{eff}_{ws}))) \times 10^3$ ($L/m^3$)

| Input Parameter | Variable | Value | Units | Notes |
|---|---|---|---|---|
| Effective diffusivity - capillary fringe zone | $D^{eff}_{cap}$ | Calculated | $cm^2/s$ | ASTM (2015ab) |
| Molecular diffusion coefficient in air | $D_{air}$ | Calculated | $cm^2/s$ | ASTM (2015ab) |
| Volumetric air content in capillary fringe | $\Theta_{acap}$ | 0.038 | $cm^3$-air / $cm^3$-soil | Default value (ASTM, 2015ab) |
| Total soil porosity | $\Theta_t$ | 0.38 | $cm^3$-pore space / $cm^3$-soil | Default value (ASTM, 2015ab) |
| Molecular diffusion coefficient in water | $D_{wat}$ | Calculated | $cm^2/s$ | ASTM (2015ab) |
| Henry's law constant at system temperature | $H'_{TS}$ | Calculated | $cm^3$-water / $cm^3$-air | See Table A4-5, Henry's Law at Constant System Temperature |
| Volumetric water content in capillary fringe | $\Theta_{wcap}$ | 0.342 | $cm^3$-$H_2O$ / $cm^3$-soil | Default value (ASTM, 2015ab) |
| Effective diffusivity - soil (vadose zone) | $D^{eff}_{s}$ | Calculated | $cm^2/s$ | ASTM (2015ab) |
| Volumetric air content in vadose zone | $\Theta_{as}$ | 0.26 | $cm^3$-air / $cm^3$-soil | Default value (ASTM, 2015ab) |
| Volumetric water content in vadose zone | $\Theta_{ws}$ | 0.12 | $cm^3$-$H_2O$ / $cm^3$-soil | Default value (ASTM, 2015ab) |
| Effective diffusivity - water table to soil surface | $D^{eff}_{ws}$ | Calculated | $cm^2/s$ | ASTM (2015ab) |
| Thickness of capillary fringe | $h_{cap}$ | 5 | cm | Default value (ASTM, 2015ab) |
| Thickness of vadose zone | $h_v$ | 147 | cm | $L_{gw}$ - $h_{cap}$ (ASTM, 2015) |
| Volatilization factor - groundwater to ambient (outdoor) air | $VF_{w,amb}$ | Calculated | ($mg/m^3$)-air / (mg/L)-water | ASTM (2015ab) |
| Volatilization factor - groundwater to trench air | $VF_{w,trench}$ | Calculated | ($mg/m^3$)-air / (mg/L)-water | VDEQ trench model (VDEQ, 2020) |
| Wind speed | $U_{air}$ | 225 | cm/s | Professional judgment: ambient (outdoor) air (5 miles/hr) |
| Wind speed - trench | $U_{air}$ | 22.5 | cm/s | Professional judgment: trench (0.5 miles/hr) |
| Ambient air mixing zone height | $\delta_{air}$ | 200 | cm | Default value (ASTM, 2015ab) |
| Depth to groundwater | $L_{gw}$ | 152 | cm | Site-specific; 4.99 feet bgs (minimum depth to groundwater used during |
| Width of source area | W | 1500 | cm | Default value (ASTM, 2015ab) |
| Length of source area - trench | L VDEQ | 2.44 | m | VDEQ trench model default (VDEQ, 2020) |
| Width of source area - trench | W VDEQ | 0.91 | m | VDEQ trench model default (VDEQ, 2020) |
| Depth of source area - trench | D VDEQ | 2.44 | m | VDEQ trench model default (VDEQ, 2020) |

References:

ASTM. 2015a. Standard Guide for Risk-Based Corrective Action. Designation: E2081-00 (Reapproved 2015)

ASTM. 2015b. Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites. Designation: E1739-95 (Reapproved 2015)

Virginia Department of Environmental Quality (VDEQ). 2020. Virginia Unified Risk Assessment Model (VURAM) User's Guide, Version 3.1.

Table A4-12
Trench Model Output
Project 15 CDL, WFF FUDS, Wallops Island, VA

| For Mass-Transfer Coefficients | | | For Emission Flux and Concentration in Trench | | | Trench dimensions | | |
|---|---|---|---|---|---|---|---|---|
| Kg,H2O | 0.833 | cm/s | CF1 | 1.00E-03 | L/cm3 | Length | **8** | ft |
| MWH2O | 18 | | CF2 | 1.00E+04 | cm2/m2 | | 2.44 | m |
| Kl,O2 | 0.002 | cm/s | CF3 | 3600 | s/hr | Width | **3** | ft |
| MWO2 | 32 | | F | **1** | | | 0.91 | m |
| T | **77** | F | ACH | 2 | hr-1 | Depth | **8** | ft |
| T | 298 | K | | | | | 2.44 | m |
| R | 8.20E-05 | atm-m3/mol-K | | | | Width/Depth | 0.38 | |

Table A4-12
Trench Model Output
Project 15 CDL, WFF FUDS, Wallops Island, VA

| Table 3.8 Exposure-point concentrations (inhalation) for construction/utility in a trench: Groundwater less than 15 feet deep<br>revised 10/5/07 | CAS No. | Molecular Weight MWi (g/mol) | Henry's Law Constant Hi (atm-m3/mol) | Gas-Phase Mass Transfer Coefficient KiG (cm/s) | Liquid-Phase Mass Transfer Coefficient KiL (cm/s) | Overall Mass Transfer Coefficient Ki (cm/s) | Volatilization Factor VF (L/m3) |
|---|---|---|---|---|---|---|---|
| TAL Inorganics | | | | | | | |
| Aluminum | 7429-90-5 | 26.98 | | | | | |
| Antimony | 7440-36-0 | 121.76 | | | | | |
| Arsenic | 7440-38-2 | 74.92 | | | | | |
| Barium | 7440-39-3 | 137.33 | | | | | |
| Beryllium | 7440-41-7 | 9.01 | | | | | |
| Cadmium (water) | 7440-43-9 | 112.41 | | | | | |
| | | | | | | | |
| Calcium | 7440-70-2 | 40.08 | | | | | |
| Chromium | 7440-47-3 | 52.00 | | | | | |
| Cobalt | 7440-48-4 | 58.93 | | | | | |
| Copper | 7440-50-8 | 63.55 | | | | | |
| Cyanide | 57-12-5 | 26.02 | 1.33E-04 | 7.36E-01 | 2.22E-03 | 1.43E-03 | 1.05E+01 |
| Iron | 7439-89-6 | 55.85 | | | | | |
| Lead | 7439-92-1 | 207.20 | | | | | |
| Magnesium | 7439-95-4 | 24.31 | | | | | |
| Manganese (nonfood) | 7439-96-5 | 54.94 | | | | | |
| | | | | | | | |
| Mercuric chloride | 7487-94-7 | 271.50 | | | | | |
| Mercury | 7439-97-6 | 200.59 | 1.14E-02 | 3.71E-01 | 7.99E-04 | 7.95E-04 | 5.87E+00 |
| Methylmercury | 22967-92-6 | 215.63 | | | | | |
| Nickel | 7440-02-0 | 58.69 | | | | | |
| Potassium | 7440-09-7 | 39.10 | | | | | |
| Selenium | 7782-49-2 | 78.96 | | | | | |
| Silver | 7440-22-4 | 107.87 | | | | | |
| Sodium | 7440-23-5 | 22.99 | | | | | |
| Thallium | 7440-28-0 | 204.38 | | | | | |
| Vanadium | 7440-62-2 | 50.94 | | | | | |
| Zinc | 7440-66-6 | 65.39 | | | | | |
| Other Inorganics | | | | | | | |
| Perchlorate | | | | | | | |
| TCL Volatile Organic Compounds (VOCs) | | | | | | | |
| Acetone | 67-64-1 | 58.08 | 3.88E-05 | 5.63E-01 | 1.48E-03 | 5.58E-04 | 4.12E+00 |
| Benzene | 71-43-2 | 78.11 | 5.55E-03 | 5.09E-01 | 1.28E-03 | 1.27E-03 | 9.35E+00 |
| Bromochloromethane | 74-97-5 | 139.38 | 1.46E-03 | 4.20E-01 | 9.58E-04 | 9.23E-04 | 6.81E+00 |
| Bromodichloromethane | 75-27-4 | 163.83 | 1.60E-03 | 3.98E-01 | 8.84E-04 | 8.55E-04 | 6.31E+00 |
| Bromoform | 75-25-2 | 252.73 | 5.35E-04 | 3.44E-01 | 7.12E-04 | 6.50E-04 | 4.80E+00 |
| Bromomethane | 74-83-9 | 94.94 | 6.24E-03 | 4.77E-01 | 1.16E-03 | 1.15E-03 | 8.49E+00 |
| 2-Butanone (methyl ethyl ketone) | 78-93-3 | 72.11 | 5.59E-05 | 5.23E-01 | 1.33E-03 | 6.31E-04 | 4.65E+00 |
| Carbon disulfide | 75-15-0 | 76.14 | 3.03E-02 | 5.14E-01 | 1.30E-03 | 1.29E-03 | 9.55E+00 |
| Carbon tetrachloride | 56-23-5 | 153.82 | 3.04E-02 | 4.06E-01 | 9.12E-04 | 9.11E-04 | 6.72E+00 |
| Chlorobenzene | 108-90-7 | 112.56 | 3.70E-03 | 4.51E-01 | 1.07E-03 | 1.05E-03 | 7.75E+00 |
| Chloroethane | 75-00-3 | 64.51 | 8.82E-03 | 5.43E-01 | 1.41E-03 | 1.40E-03 | 1.03E+01 |
| Chloroform | 67-66-3 | 119.38 | 3.67E-03 | 4.42E-01 | 1.04E-03 | 1.02E-03 | 7.53E+00 |
| Chloromethane | 74-87-3 | 50.49 | 8.82E-03 | 5.90E-01 | 1.59E-03 | 1.58E-03 | 1.17E+01 |
| Cyclohexane | 110-82-7 | 84.16 | 1.95E-01 | 4.97E-01 | 1.23E-03 | 1.23E-03 | 9.10E+00 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 236.33 | 1.47E-04 | 3.52E-01 | 7.36E-04 | 5.46E-04 | 4.03E+00 |
| Dibromochloromethane | 124-48-1 | 208.28 | 7.83E-04 | 3.67E-01 | 7.84E-04 | 7.35E-04 | 5.43E+00 |
| 1,2-Dibromoethane | 106-93-4 | 187.86 | 7.43E-04 | 3.80E-01 | 8.25E-04 | 7.70E-04 | 5.69E+00 |

Table A4-12
Trench Model Output
Project 15 CDL, WFF FUDS, Wallops Island, VA

| Table 3.8 Exposure-point concentrations (inhalation) for construction/utility in a trench: Groundwater less than 15 feet deep<br>revised 10/5/07 | CAS No. | Molecular Weight MWi (g/mol) | Henry's Law Constant Hi (atm-m3/mol) | Gas-Phase Mass Transfer Coefficient KiG (cm/s) | Liquid-Phase Mass Transfer Coefficient KiL (cm/s) | Overall Mass Transfer Coefficient Ki (cm/s) | Volatilization Factor VF (L/m3) |
|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene (ortho) | 95-50-1 | 147.00 | 1.90E-03 | 4.12E-01 | 9.33E-04 | 9.07E-04 | 6.69E+00 |
| 1,3-Dichlorobenzene (meta) | 541-73-1 | 147.00 | 3.10E-03 | 4.12E-01 | 9.33E-04 | 9.17E-04 | 6.77E+00 |
| 1,4-Dichlorobenzene (para) | 106-46-7 | 147.00 | 2.43E-03 | 4.12E-01 | 9.33E-04 | 9.12E-04 | 6.74E+00 |
| Dichlorodifluoromethane | 75-71-8 | 120.91 | 3.43E-01 | 4.40E-01 | 1.03E-03 | 1.03E-03 | 7.59E+00 |
| 1,1-Dichloroethane | 75-34-3 | 98.96 | 5.62E-03 | 4.71E-01 | 1.14E-03 | 1.13E-03 | 8.31E+00 |
| 1,2-Dichloroethane | 107-06-2 | 98.96 | 9.79E-04 | 4.71E-01 | 1.14E-03 | 1.07E-03 | 7.92E+00 |
| 1,1-Dichloroethene | 75-35-4 | 96.94 | 2.61E-02 | 4.74E-01 | 1.15E-03 | 1.15E-03 | 8.46E+00 |
| 1,2-Dichloroethene (total) | 540-59-0 | 96.94 | 4.51E-03 | 4.74E-01 | 1.15E-03 | 1.13E-03 | 8.37E+00 |
| cis-1,2-Dichloroethene | 156-59-2 | 96.94 | 4.08E-03 | 4.74E-01 | 1.15E-03 | 1.13E-03 | 8.36E+00 |
| trans-1,2-Dichloroethene | 156-60-5 | 96.94 | 9.38E-03 | 4.74E-01 | 1.15E-03 | 1.14E-03 | 8.43E+00 |
| 1,2-Dichloropropane | 78-87-5 | 112.99 | 2.80E-03 | 4.50E-01 | 1.06E-03 | 1.04E-03 | 7.70E+00 |
| 1,3-Dichloropropene (total) | 542-75-6 | 110.97 | 1.77E-02 | 4.53E-01 | 1.07E-03 | 1.07E-03 | 7.90E+00 |
| cis-1,3-Dichloropropene | 10061-01-5 | 110.97 | 1.20E-03 | 4.53E-01 | 1.07E-03 | 1.02E-03 | 7.56E+00 |
| trans-1,3-Dichloropropene | 10061-02-6 | 110.97 | 8.00E-04 | 4.53E-01 | 1.07E-03 | 1.00E-03 | 7.39E+00 |
| 1,4-dioxane | 123-91-1 | 88.11 | 4.80E-06 | 4.89E-01 | 1.21E-03 | 8.90E-05 | 6.57E-01 |
| Ethylbenzene | 100-41-4 | 106.17 | 7.88E-03 | 4.60E-01 | 1.10E-03 | 1.09E-03 | 8.05E+00 |
| Hexane | 110-54-3 | 86.18 | 1.69E+00 | 4.93E-01 | 1.22E-03 | 1.22E-03 | 9.00E+00 |
| 2-Hexanone | 591-78-6 | 100.16 | 9.32E-05 | 4.69E-01 | 1.13E-03 | 6.93E-04 | 5.11E+00 |
| Isopropylbenzene | 98-82-8 | 120.19 | 1.16E+00 | 4.41E-01 | 1.03E-03 | 1.03E-03 | 7.62E+00 |
| 4-Methyl-2-pentanone (methyl isobutyl ket | 108-10-1 | 100.16 | 1.38E-04 | 4.69E-01 | 1.13E-03 | 7.92E-04 | 5.85E+00 |
| Methyl acetate | 79-20-9 | 74.08 | 1.15E-04 | 5.19E-01 | 1.31E-03 | 8.54E-04 | 6.31E+00 |
| Methyl tert-butyl ether | 1634-04-4 | 88.15 | 5.87E-04 | 4.89E-01 | 1.21E-03 | 1.09E-03 | 8.07E+00 |
| Methylcyclohexane | 108-87-2 | 98.19 | 4.30E-01 | 4.72E-01 | 1.14E-03 | 1.14E-03 | 8.43E+00 |
| Methylene chloride | 75-09-2 | 84.93 | 2.19E-03 | 4.95E-01 | 1.23E-03 | 1.19E-03 | 8.82E+00 |
| Styrene | 100-42-5 | 104.15 | 2.75E-03 | 4.63E-01 | 1.11E-03 | 1.09E-03 | 8.01E+00 |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 167.85 | 3.45E-04 | 3.94E-01 | 8.73E-04 | 7.55E-04 | 5.57E+00 |
| Tetrachloroethene | 127-18-4 | 165.83 | 1.84E-02 | 3.96E-01 | 8.79E-04 | 8.76E-04 | 6.47E+00 |
| Toluene | 108-88-3 | 92.14 | 6.64E-03 | 4.82E-01 | 1.18E-03 | 1.17E-03 | 8.62E+00 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | 76-13-1 | 187.37 | 4.81E-01 | 3.80E-01 | 8.27E-04 | 8.26E-04 | 6.10E+00 |
| 1,2,3-Trichlorobenzene | 87-61-6 | 181.45 | 1.25E-03 | 3.84E-01 | 8.40E-04 | 8.05E-04 | 5.95E+00 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 181.45 | 1.42E-03 | 3.84E-01 | 8.40E-04 | 8.09E-04 | 5.98E+00 |
| 1,1,1-Trichloroethane | 71-55-6 | 133.40 | 1.72E-02 | 4.26E-01 | 9.80E-04 | 9.76E-04 | 7.21E+00 |
| 1,1,2-Trichloroethane | 79-00-5 | 133.40 | 9.13E-04 | 4.26E-01 | 9.80E-04 | 9.23E-04 | 6.81E+00 |
| Trichloroethene | 79-01-6 | 131.39 | 1.03E-02 | 4.28E-01 | 9.87E-04 | 9.82E-04 | 7.25E+00 |
| Trichlorofluoromethane | 75-69-4 | 137.37 | 9.70E-02 | 4.22E-01 | 9.65E-04 | 9.65E-04 | 7.12E+00 |
| Vinyl Chloride | 75-01-4 | 62.50 | 2.70E-02 | 5.49E-01 | 1.43E-03 | 1.43E-03 | 1.05E+01 |
| Total Xylenes | 1330-20-7 | 106.16 | 5.18E-03 | 4.60E-01 | 1.10E-03 | 1.09E-03 | 8.02E+00 |
| Other VOCs | | | | | | | |
| n-butylbenzene | 104-51-8 | 134.22 | 1.59E-02 | 4.25E-01 | 9.77E-04 | 9.73E-04 | 7.18E+00 |
| sec-butylbenzene | 135-98-8 | 134.22 | 1.76E-02 | 4.25E-01 | 9.77E-04 | 9.73E-04 | 7.19E+00 |
| tert-butylbenzene | 98-06-6 | 134.22 | 1.32E-02 | 4.25E-01 | 9.77E-04 | 9.72E-04 | 7.18E+00 |
| isopropyltoluene | 99-87-6 | 134.22 | 1.10E-02 | 4.25E-01 | 9.77E-04 | 9.72E-04 | 7.17E+00 |
| n-propylbenzene | 103-65-1 | 120.19 | 1.05E-02 | 4.41E-01 | 1.03E-03 | 1.03E-03 | 7.58E+00 |
| 1,1,1,2-tetrachloroethane | 630-20-6 | 167.85 | 2.42E-03 | 3.94E-01 | 8.73E-04 | 8.54E-04 | 6.31E+00 |
| 1,2,4-trimethylbenzene | 95-63-6 | 120.19 | 6.16E-03 | 4.41E-01 | 1.03E-03 | 1.02E-03 | 7.55E+00 |
| 1,3,5-trimethylbenzene | 108-67-8 | 120.19 | 8.77E-03 | 4.41E-01 | 1.03E-03 | 1.03E-03 | 7.57E+00 |
| m-xylene | 108-38-3 | 106.17 | 7.34E-03 | 4.60E-01 | 1.10E-03 | 1.09E-03 | 8.04E+00 |
| o-xylene | 95-47-6 | 106.17 | 5.19E-03 | 4.60E-01 | 1.10E-03 | 1.09E-03 | 8.02E+00 |
| p-xylene | 106-42-3 | 106.17 | 7.66E-03 | 4.60E-01 | 1.10E-03 | 1.09E-03 | 8.04E+00 |

Table A4-12
Trench Model Output
Project 15 CDL, WFF FUDS, Wallops Island, VA

| Table 3.8 Exposure-point concentrations (inhalation) for construction/utility in a trench: Groundwater less than 15 feet deep<br>revised 10/5/07 | CAS No. | Molecular Weight MWi (g/mol) | Henry's Law Constant Hi (atm-m3/mol) | Gas-Phase Mass Transfer Coefficient KiG (cm/s) | Liquid-Phase Mass Transfer Coefficient KiL (cm/s) | Overall Mass Transfer Coefficient Ki (cm/s) | Volatilization Factor VF (L/m3) |
|---|---|---|---|---|---|---|---|
| TCL Semivolatile Organic Compounds (SVOCs) | | | | | | | |
| Acenaphthene | 83-32-9 | 154.21 | 1.55E-04 | 4.06E-01 | 9.11E-04 | 6.73E-04 | 4.97E+00 |
| Acenaphthylene | 208-96-8 | 152.19 | 1.13E-04 | 4.07E-01 | 9.17E-04 | 6.17E-04 | 4.55E+00 |
| Acetophenone | 98-86-2 | 120.15 | 1.07E-05 | 4.41E-01 | 1.03E-03 | 1.63E-04 | 1.20E+00 |
| Anthracene | 120-12-7 | 178.23 | 6.50E-05 | 3.86E-01 | 8.47E-04 | 4.65E-04 | 3.43E+00 |
| Atrazine | 1912-24-9 | 215.68 | 2.36E-09 | 3.63E-01 | 7.70E-04 | 3.50E-08 | 2.58E-04 |
| Benzaldehyde | 100-52-7 | 106.12 | 2.67E-05 | 4.60E-01 | 1.10E-03 | 3.45E-04 | 2.54E+00 |
| Benzo(a)anthracene | 56-55-3 | 228.29 | 3.35E-06 | 3.56E-01 | 7.49E-04 | 4.58E-05 | 3.38E-01 |
| Benzo(a)pyrene | 50-32-8 | 252.31 | 1.13E-06 | 3.44E-01 | 7.12E-04 | 1.56E-05 | 1.15E-01 |
| Benzo(b)fluoranthene | 205-99-2 | 252.31 | 1.11E-04 | 3.44E-01 | 7.12E-04 | 4.89E-04 | 3.61E+00 |
| Benzo(g,h,i)perylene | 191-24-2 | 276.33 | 1.41E-07 | 3.34E-01 | 6.81E-04 | 1.92E-06 | 1.42E-02 |
| Benzo(k)fluoranthene | 207-08-9 | 252.31 | 8.29E-07 | 3.44E-01 | 7.12E-04 | 1.15E-05 | 8.48E-02 |
| 1,1'-Biphenyl | 92-52-4 | 154.21 | 3.00E-04 | 4.06E-01 | 9.11E-04 | 7.70E-04 | 5.69E+00 |
| bis(2-Chloroethoxy)methane | 111-91-1 | 173.04 | 1.70E-07 | 3.90E-01 | 8.60E-04 | 2.71E-06 | 2.00E-02 |
| bis(2-chloroethyl)ether | 111-44-4 | 143.01 | 1.80E-05 | 4.16E-01 | 9.46E-04 | 2.31E-04 | 1.71E+00 |
| bis-(2-Ethylhexyl)phthalate | 117-81-7 | 390.56 | 1.02E-07 | 2.97E-01 | 5.72E-04 | 1.24E-06 | 9.14E-03 |
| 4-Bromophenyl-phenylether | 101-55-3 | 249.10 | 1.17E-04 | 3.45E-01 | 7.17E-04 | 5.00E-04 | 3.69E+00 |
| Butylbenzylphthalate | 85-68-7 | 312.36 | 1.26E-06 | 3.20E-01 | 6.40E-04 | 1.61E-05 | 1.19E-01 |
| Caprolactam | 105-60-2 | 113.16 | 2.53E-08 | 4.50E-01 | 1.06E-03 | 4.66E-07 | 3.44E-03 |
| Carbazole | 86-74-8 | 167.21 | 1.54E-08 | 3.95E-01 | 8.75E-04 | 2.49E-07 | 1.84E-03 |
| 4-Chloro-3-methylphenol | 59-50-7 | 142.58 | 2.45E-06 | 4.16E-01 | 9.47E-04 | 4.00E-05 | 2.95E-01 |
| 4-Chloroaniline | 106-47-8 | 127.57 | 3.31E-07 | 4.32E-01 | 1.00E-03 | 5.82E-06 | 4.30E-02 |
| 2-Chloronaphthalene | 91-58-7 | 162.62 | 3.14E-04 | 3.98E-01 | 8.87E-04 | 7.56E-04 | 5.58E+00 |
| 2-Chlorophenol | 95-57-8 | 128.56 | 3.91E-04 | 4.31E-01 | 9.98E-04 | 8.72E-04 | 6.44E+00 |
| 4-Chlorophenyl-phenylether | 7005-72-3 | 204.65 | 9.00E-05 | 3.69E-01 | 7.91E-04 | 5.00E-04 | 3.69E+00 |
| Chrysene | 218-01-9 | 228.29 | 9.46E-05 | 3.56E-01 | 7.49E-04 | 4.85E-04 | 3.58E+00 |
| Di-n-butylphthalate | 84-74-2 | 278.34 | 9.38E-10 | 3.33E-01 | 6.78E-04 | 1.28E-08 | 9.43E-05 |
| Di-n-octylphthalate | 117-84-0 | 390.56 | 6.68E-05 | 2.97E-01 | 5.72E-04 | 3.36E-04 | 2.48E+00 |
| Dibenzo(a,h)anthracene | 53-70-3 | 278.35 | 1.47E-08 | 3.33E-01 | 6.78E-04 | 2.00E-07 | 1.48E-03 |
| Dibenzofuran | 132-64-9 | 168.19 | 1.26E-05 | 3.94E-01 | 8.72E-04 | 1.65E-04 | 1.22E+00 |
| 3,3'-Dichlorobenzidine | 91-94-1 | 253.13 | 4.00E-09 | 3.44E-01 | 7.11E-04 | 5.62E-08 | 4.15E-04 |
| 2,4-Dichlorophenol | 120-83-2 | 163.00 | 3.16E-06 | 3.98E-01 | 8.86E-04 | 4.87E-05 | 3.59E-01 |
| Diethylphthalate | 84-66-2 | 222.24 | 4.50E-07 | 3.59E-01 | 7.59E-04 | 6.55E-06 | 4.84E-02 |
| 2,4-Dimethylphenol | 105-67-9 | 122.16 | 2.00E-06 | 4.39E-01 | 1.02E-03 | 3.47E-05 | 2.56E-01 |
| Dimethylphthalate | 131-11-3 | 194.18 | 1.05E-07 | 3.76E-01 | 8.12E-04 | 1.61E-06 | 1.19E-02 |
| 4,6-Dinitro-2-methylphenol | 534-52-1 | 198.13 | 4.27E-07 | 3.73E-01 | 8.04E-04 | 6.47E-06 | 4.77E-02 |
| 2,4-Dinitrophenol | 51-28-5 | 184.11 | 4.43E-07 | 3.82E-01 | 8.34E-04 | 6.87E-06 | 5.07E-02 |
| 2,4-Dinitrotoluene | 121-14-2 | 182.13 | 9.26E-08 | 3.84E-01 | 8.38E-04 | 1.45E-06 | 1.07E-02 |
| 2,6-Dinitrotoluene | 606-20-2 | 182.13 | 7.47E-07 | 3.84E-01 | 8.38E-04 | 1.16E-05 | 8.54E-02 |
| Fluoranthene | 206-44-0 | 202.25 | 1.61E-05 | 3.70E-01 | 7.96E-04 | 1.87E-04 | 1.38E+00 |
| Fluorene | 86-73-7 | 166.22 | 6.36E-05 | 3.96E-01 | 8.78E-04 | 4.74E-04 | 3.50E+00 |
| Hexachlorobenzene | 118-74-1 | 284.78 | 1.32E-03 | 3.30E-01 | 6.70E-04 | 6.46E-04 | 4.77E+00 |
| Hexachlorobutadiene | 87-68-3 | 260.76 | 8.15E-03 | 3.40E-01 | 7.01E-04 | 6.96E-04 | 5.14E+00 |
| Hexachlorocyclopentadiene | 77-47-4 | 272.77 | 2.70E-02 | 3.35E-01 | 6.85E-04 | 6.84E-04 | 5.05E+00 |
| Hexachloroethane | 67-72-1 | 236.74 | 3.89E-03 | 3.51E-01 | 7.35E-04 | 7.26E-04 | 5.36E+00 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 276.33 | 1.60E-06 | 3.34E-01 | 6.81E-04 | 2.12E-05 | 1.56E-01 |
| Isophorone | 78-59-1 | 138.21 | 6.64E-06 | 4.21E-01 | 9.62E-04 | 1.02E-04 | 7.54E-01 |
| 2-Methylnaphthalene | 91-57-6 | 142.20 | 5.18E-04 | 4.17E-01 | 9.49E-04 | 8.57E-04 | 6.32E+00 |
| 2-Methylphenol | 95-48-7 | 108.14 | 1.20E-06 | 4.57E-01 | 1.09E-03 | 2.20E-05 | 1.62E-01 |

Table A4-12
Trench Model Output
Project 15 CDL, WFF FUDS, Wallops Island, VA

| Table 3.8 Exposure-point concentrations (inhalation) for construction/utility in a trench: Groundwater less than 15 feet deep<br>revised 10/5/07 | CAS No. | Molecular Weight MWi (g/mol) | Henry's Law Constant Hi (atm-m3/mol) | Gas-Phase Mass Transfer Coefficient KiG (cm/s) | Liquid-Phase Mass Transfer Coefficient KiL (cm/s) | Overall Mass Transfer Coefficient Ki (cm/s) | Volatilization Factor VF (L/m3) |
|---|---|---|---|---|---|---|---|
| 3-Methylphenol | 108-39-4 | 108.14 | 8.65E-07 | 4.57E-01 | 1.09E-03 | 1.59E-05 | 1.18E-01 |
| 4-Methylphenol | 106-44-5 | 108.14 | 7.92E-07 | 4.57E-01 | 1.09E-03 | 1.46E-05 | 1.08E-01 |
| N-Nitroso-di-n-propylamine | 621-64-7 | 130.19 | 2.25E-06 | 4.29E-01 | 9.92E-04 | 3.80E-05 | 2.81E-01 |
| N-Nitrosodiphenylamine | 86-30-6 | 198.22 | 5.00E-06 | 3.73E-01 | 8.04E-04 | 6.97E-05 | 5.14E-01 |
| Naphthalene | 91-20-3 | 128.17 | 4.83E-04 | 4.32E-01 | 9.99E-04 | 8.95E-04 | 6.60E+00 |
| 2-Nitroaniline | 88-74-4 | 138.12 | 1.09E-07 | 4.21E-01 | 9.63E-04 | 1.87E-06 | 1.38E-02 |
| 3-Nitroaniline | 99-09-2 | 138.12 | 1.44E-07 | 4.21E-01 | 9.63E-04 | 2.47E-06 | 1.83E-02 |
| 4-Nitroaniline | 100-01-6 | 138.12 | 2.07E-09 | 4.21E-01 | 9.63E-04 | 3.57E-08 | 2.63E-04 |
| Nitrobenzene | 98-95-3 | 123.11 | 2.40E-05 | 4.37E-01 | 1.02E-03 | 3.02E-04 | 2.23E+00 |
| 2-Nitrophenol | 88-75-5 | 139.11 | 9.47E-06 | 4.20E-01 | 9.59E-04 | 1.39E-04 | 1.03E+00 |
| 4-Nitrophenol | 100-02-7 | 139.11 | 4.15E-10 | 4.20E-01 | 9.59E-04 | 7.13E-09 | 5.26E-05 |
| 2,2'-Oxybis(1-chloropropane) | 108-60-1 | 171.06 | 1.17E-04 | 3.92E-01 | 8.65E-04 | 5.92E-04 | 4.37E+00 |
| Pentachlorophenol | 87-86-5 | 266.34 | 2.44E-08 | 3.38E-01 | 6.93E-04 | 3.37E-07 | 2.49E-03 |
| Phenanthrene | 85-01-8 | 178.23 | 2.33E-05 | 3.86E-01 | 8.47E-04 | 2.57E-04 | 1.90E+00 |
| Phenol | 108-95-2 | 94.11 | 3.97E-07 | 4.79E-01 | 1.17E-03 | 7.72E-06 | 5.70E-02 |
| Pyrene | 129-00-0 | 202.25 | 1.10E-05 | 3.70E-01 | 7.96E-04 | 1.38E-04 | 1.02E+00 |
| 1,2,4,5-Tetrachlorobenzene | 95-94-3 | 215.89 | 2.58E-03 | 3.62E-01 | 7.70E-04 | 7.55E-04 | 5.57E+00 |
| 2,3,4,6-Tetrachlorophenol | 58-90-2 | 231.89 | 4.39E-06 | 3.54E-01 | 7.43E-04 | 5.86E-05 | 4.32E-01 |
| 2,4,5-Trichlorophenol | 95-95-4 | 197.45 | 4.33E-06 | 3.73E-01 | 8.05E-04 | 6.11E-05 | 4.51E-01 |
| 2,4,6-Trichlorophenol | 88-06-2 | 197.45 | 7.79E-06 | 3.73E-01 | 8.05E-04 | 1.04E-04 | 7.66E-01 |
| Other SVOCs | | | | | | | |
| Benzoic acid | 65-85-0 | 122.12 | 3.81E-08 | 4.39E-01 | 1.02E-03 | 6.83E-07 | 5.04E-03 |
| TCL Polychlorinated Biphenyls (PCBs) | | | | | | | |
| Aroclor-1016 | 12674-11-2 | 257.90 | 2.90E-04 | 3.41E-01 | 7.04E-04 | 6.00E-04 | 4.43E+00 |
| Aroclor-1221 | 11104-28-2 | 200.70 | 3.50E-03 | 3.71E-01 | 7.99E-04 | 7.87E-04 | 5.81E+00 |
| Aroclor-1232 | 11141-16-5 | 232.20 | 7.36E-04 | 3.54E-01 | 7.42E-04 | 6.94E-04 | 5.12E+00 |
| Aroclor-1242 | 53469-21-9 | 266.50 | 5.20E-04 | 3.38E-01 | 6.93E-04 | 6.32E-04 | 4.67E+00 |
| Aroclor-1248 | 12672-29-6 | 299.50 | 2.80E-03 | 3.25E-01 | 6.54E-04 | 6.42E-04 | 4.74E+00 |
| Aroclor-1254 | 11097-69-1 | 328.00 | 2.00E-03 | 3.15E-01 | 6.25E-04 | 6.10E-04 | 4.50E+00 |
| Aroclor-1260 | 11096-82-5 | 375.70 | 4.60E-03 | 3.01E-01 | 5.84E-04 | 5.78E-04 | 4.26E+00 |
| Aroclor-1262 | 37324-23-5 | 389.00 | 4.60E-03 | 2.98E-01 | 5.74E-04 | 5.68E-04 | 4.19E+00 |
| Aroclor-1268 | 11100-14-4 | 453.00 | 4.60E-03 | 2.83E-01 | 5.32E-04 | 5.26E-04 | 3.89E+00 |
| Total PCBs | 1336-36-3 | | | | | | |
| TCL Pesticides | | | | | | | |
| Aldrin | 309-00-2 | 364.91 | 1.70E-04 | 3.04E-01 | 5.92E-04 | 4.63E-04 | 3.42E+00 |
| alpha-BHC | 319-84-6 | 290.83 | 1.06E-05 | 3.28E-01 | 6.63E-04 | 1.17E-04 | 8.65E-01 |
| beta-BHC | 319-85-7 | 290.83 | 7.43E-07 | 3.28E-01 | 6.63E-04 | 9.82E-06 | 7.25E-02 |
| delta-BHC | 319-86-8 | 290.83 | 4.29E-07 | 3.28E-01 | 6.63E-04 | 5.71E-06 | 4.21E-02 |
| gamma-BHC (lindane) | 58-89-9 | 290.83 | 1.40E-05 | 3.28E-01 | 6.63E-04 | 1.46E-04 | 1.08E+00 |
| Chlordane | 57-74-9 | 409.78 | 4.86E-05 | 2.92E-01 | 5.59E-04 | 2.85E-04 | 2.10E+00 |
| alpha-Chlordane | 5103-71-9 | 409.76 | 4.86E-05 | 2.92E-01 | 5.59E-04 | 2.85E-04 | 2.10E+00 |
| gamma-Chlordane | 5103-74-2 | 409.76 | 4.86E-05 | 2.92E-01 | 5.59E-04 | 2.85E-04 | 2.10E+00 |
| 4,4'-DDD | 72-54-8 | 320.04 | 4.00E-06 | 3.18E-01 | 6.32E-04 | 4.80E-05 | 3.55E-01 |
| 4,4'-DDE | 72-55-9 | 318.02 | 2.10E-05 | 3.18E-01 | 6.34E-04 | 1.91E-04 | 1.41E+00 |
| 4,4'-DDT | 50-29-3 | 354.48 | 8.10E-06 | 3.07E-01 | 6.01E-04 | 8.70E-05 | 6.42E-01 |
| Dieldrin | 60-57-1 | 380.91 | 1.51E-05 | 3.00E-01 | 5.80E-04 | 1.40E-04 | 1.04E+00 |
| Endosulfan | 115-29-7 | 406.92 | 1.12E-05 | 2.93E-01 | 5.61E-04 | 1.08E-04 | 8.00E-01 |
| Endosulfan I | 959-98-8 | 406.92 | 6.50E-05 | 2.93E-01 | 5.61E-04 | 3.26E-04 | 2.41E+00 |
| Endosulfan II | 33213-65-9 | 406.92 | 6.50E-05 | 2.93E-01 | 5.61E-04 | 3.26E-04 | 2.41E+00 |

Table A4-12
Trench Model Output
Project 15 CDL, WFF FUDS, Wallops Island, VA

| Table 3.8 Exposure-point concentrations (inhalation) for construction/utility in a trench: Groundwater less than 15 feet deep<br>revised 10/5/07 | CAS No. | Molecular Weight MWi (g/mol) | Henry's Law Constant Hi (atm-m3/mol) | Gas-Phase Mass Transfer Coefficient KiG (cm/s) | Liquid-Phase Mass Transfer Coefficient KiL (cm/s) | Overall Mass Transfer Coefficient Ki (cm/s) | Volatilization Factor VF (L/m3) |
|---|---|---|---|---|---|---|---|
| Endosulfan Sulfate | 1031-07-8 | 422.92 | 3.25E-07 | 2.89E-01 | 5.50E-04 | 3.82E-06 | 2.82E-02 |
| Endrin | 72-20-8 | 380.91 | 7.52E-06 | 3.00E-01 | 5.80E-04 | 7.96E-05 | 5.87E-01 |
| Endrin Aldehyde | 7421-93-4 | 380.91 | 4.18E-06 | 3.00E-01 | 5.80E-04 | 4.71E-05 | 3.48E-01 |
| Endrin Ketone | 53494-70-5 | 380.90 | 1.25E-05 | 3.00E-01 | 5.80E-04 | 1.21E-04 | 8.93E-01 |
| Heptachlor | 76-44-8 | 373.32 | 1.09E-03 | 3.02E-01 | 5.86E-04 | 5.61E-04 | 4.14E+00 |
| Heptachlor epoxide | 1024-57-3 | 389.32 | 9.50E-06 | 2.97E-01 | 5.73E-04 | 9.62E-05 | 7.10E-01 |
| Methoxychlor | 72-43-5 | 345.65 | 1.58E-05 | 3.10E-01 | 6.09E-04 | 1.51E-04 | 1.11E+00 |
| Toxaphene | 8001-35-2 | 414.00 | 6.00E-06 | 2.91E-01 | 5.56E-04 | 6.34E-05 | 4.68E-01 |
| Chlorinated dioxins/dibenzofurans (CDDs/CDFs) | | | | | | | |
| 2,3,7,8-TCDD | 1746-01-6 | 322.00 | 7.92E-05 | 3.17E-01 | 6.30E-04 | 3.91E-04 | 2.88E+00 |
| 2,3,7,8-TCDF | 51207-31-9 | 305.97 | 2.64E-04 | 3.22E-01 | 6.47E-04 | 5.46E-04 | |

Table A4-13
Modeled Groundwater-to-Vapor Concentrations while Showering
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Volatile Chemical of Potential Concern (Potable Use) | CASRN | MW (g/mol) | H (atm-$m^3$/mol) | $k_l$ (cm/hr) | $k_g$ (cm/hr) | $K_L$ (cm/hr) | $K_{aL}$ (cm/hr) | $C_w$ [(1)] (ug/L) | $C_{wd}$ (ug/L) | S (ug/$m^3$-min) | $C_a$ (ug/$m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Volatile Organic Compounds (VOCs) | | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | 1.68E+02 | 3.67E-04 | 1.02E+01 | 9.82E+02 | 6.09E+00 | 8.22E+00 | 1.00E+00 | 2.40E-01 | 7.99E-01 | 4.79E-02 |
| 1,1,2-Trichloroethane | 79-00-5 | 1.33E+02 | 8.24E-04 | 1.15E+01 | 1.10E+03 | 8.81E+00 | 1.19E+01 | 1.00E+00 | 3.27E-01 | 1.09E+00 | 6.55E-02 |
| 1,2,4-Trichlorobenzene | 120-82-1 | 1.81E+02 | 1.42E-03 | 9.85E+00 | 9.45E+02 | 8.37E+00 | 1.13E+01 | 1.00E+00 | 3.14E-01 | 1.05E+00 | 6.28E-02 |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | 2.36E+02 | 1.47E-04 | 8.63E+00 | 8.28E+02 | 3.19E+00 | 4.31E+00 | 1.00E+00 | 1.34E-01 | 4.46E-01 | 2.68E-02 |
| 1,2-Dibromoethane | 106-93-4 | 1.88E+02 | 6.50E-04 | 9.68E+00 | 9.29E+02 | 6.99E+00 | 9.44E+00 | 1.00E+00 | 2.70E-01 | 9.00E-01 | 5.40E-02 |
| 1,2-Dichloroethane | 107-06-2 | 9.90E+01 | 1.18E-03 | 1.33E+01 | 1.28E+03 | 1.10E+01 | 1.49E+01 | 1.00E+00 | 3.91E-01 | 1.30E+00 | 7.81E-02 |
| 1,2-Dichloropropane | 78-87-5 | 1.13E+02 | 2.82E-03 | 1.25E+01 | 1.20E+03 | 1.15E+01 | 1.55E+01 | 1.00E+00 | 4.03E-01 | 1.34E+00 | 8.06E-02 |
| 1,4-Dichlorobenzene | 106-46-7 | 1.47E+02 | 2.41E-03 | 1.09E+01 | 1.05E+03 | 9.91E+00 | 1.34E+01 | 1.00E+00 | 3.60E-01 | 1.20E+00 | 7.20E-02 |
| 2-Hexanone | 591-78-6 | 1.00E+02 | 9.32E-05 | 1.33E+01 | 1.27E+03 | 3.60E+00 | 4.86E+00 | 1.00E+00 | 1.49E-01 | 4.98E-01 | 2.99E-02 |
| Benzene | 71-43-2 | 7.81E+01 | 5.55E-03 | 1.50E+01 | 1.44E+03 | 1.44E+01 | 1.94E+01 | 1.00E+00 | 4.76E-01 | 1.59E+00 | 9.52E-02 |
| Bromodichloromethane | 75-27-4 | 1.64E+02 | 2.12E-03 | 1.04E+01 | 9.94E+02 | 9.27E+00 | 1.25E+01 | 1.00E+00 | 3.41E-01 | 1.14E+00 | 6.82E-02 |
| Bromoform | 75-25-2 | 2.53E+02 | 5.35E-04 | 8.35E+00 | 8.01E+02 | 5.68E+00 | 7.68E+00 | 1.00E+00 | 2.26E-01 | 7.53E-01 | 4.52E-02 |
| Bromomethane | 74-83-9 | 9.49E+01 | 7.34E-03 | 1.36E+01 | 1.31E+03 | 1.32E+01 | 1.78E+01 | 1.00E+00 | 4.47E-01 | 1.49E+00 | 8.94E-02 |
| Carbon Tetrachloride | 56-23-5 | 1.54E+02 | 2.76E-02 | 1.07E+01 | 1.03E+03 | 1.06E+01 | 1.43E+01 | 1.00E+00 | 3.80E-01 | 1.27E+00 | 7.59E-02 |
| Chloroform | 67-66-3 | 1.19E+02 | 3.67E-03 | 1.21E+01 | 1.16E+03 | 1.14E+01 | 1.54E+01 | 1.00E+00 | 4.01E-01 | 1.34E+00 | 8.01E-02 |
| cis-1,2-Dichloroethene | 156-59-2 | 9.69E+01 | 4.08E-03 | 1.35E+01 | 1.29E+03 | 1.27E+01 | 1.71E+01 | 1.00E+00 | 4.35E-01 | 1.45E+00 | 8.71E-02 |
| cis-1,3-Dichloropropene | 10061-01-5 | 1.11E+02 | 3.55E-03 | 1.26E+01 | 1.21E+03 | 1.18E+01 | 1.59E+01 | 1.00E+00 | 4.11E-01 | 1.37E+00 | 8.22E-02 |
| Dibromochloromethane | 124-48-1 | 2.08E+02 | 7.83E-04 | 9.19E+00 | 8.82E+02 | 6.96E+00 | 9.41E+00 | 1.00E+00 | 2.69E-01 | 8.97E-01 | 5.38E-02 |
| Ethylbenzene | 100-41-4 | 1.06E+02 | 7.88E-03 | 1.29E+01 | 1.24E+03 | 1.25E+01 | 1.69E+01 | 1.00E+00 | 4.30E-01 | 1.43E+00 | 8.60E-02 |
| Hexachlorobutadiene | 87-68-3 | 2.61E+02 | 1.03E-02 | 8.22E+00 | 7.88E+02 | 8.02E+00 | 1.08E+01 | 1.00E+00 | 3.03E-01 | 1.01E+00 | 6.06E-02 |
| Isopropylbenzene | 98-82-8 | 1.20E+02 | 1.15E-02 | 1.21E+01 | 1.16E+03 | 1.18E+01 | 1.60E+01 | 1.00E+00 | 4.13E-01 | 1.38E+00 | 8.27E-02 |
| Naphthalene | 91-20-3 | 1.28E+02 | 4.40E-04 | 1.17E+01 | 1.12E+03 | 7.47E+00 | 1.01E+01 | 1.00E+00 | 2.86E-01 | 9.52E-01 | 5.71E-02 |
| Tetrachloroethene | 127-18-4 | 1.66E+02 | 1.77E-02 | 1.03E+01 | 9.88E+02 | 1.02E+01 | 1.37E+01 | 1.00E+00 | 3.67E-01 | 1.22E+00 | 7.34E-02 |
| Toluene | 108-88-3 | 9.21E+01 | 6.64E-03 | 1.38E+01 | 1.33E+03 | 1.33E+01 | 1.80E+01 | 1.00E+00 | 4.51E-01 | 1.50E+00 | 9.02E-02 |
| trans-1,3-Dichloropropene | 10061-02-6 | 1.11E+02 | 3.55E-03 | 1.26E+01 | 1.21E+03 | 1.18E+01 | 1.59E+01 | 1.00E+00 | 4.11E-01 | 1.37E+00 | 8.22E-02 |
| Trichloroethene | 79-01-6 | 1.31E+02 | 9.85E-03 | 1.16E+01 | 1.11E+03 | 1.13E+01 | 1.52E+01 | 1.00E+00 | 3.98E-01 | 1.33E+00 | 7.97E-02 |
| Vinyl Chloride | 75-01-4 | 6.25E+01 | 2.78E-02 | 1.68E+01 | 1.61E+03 | 1.66E+01 | 2.25E+01 | 1.00E+00 | 5.27E-01 | 1.76E+00 | 1.05E-01 |
| Xylenes, Total | 1330-20-7 | 1.06E+02 | 6.63E-03 | 1.29E+01 | 1.24E+03 | 1.24E+01 | 1.68E+01 | 1.00E+00 | 4.28E-01 | 1.43E+00 | 8.56E-02 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | 1.54E+02 | 3.08E-04 | 1.07E+01 | 1.02E+03 | 5.89E+00 | 7.96E+00 | 1.00E+00 | 2.33E-01 | 7.77E-01 | 4.66E-02 |
| 2-Methylnaphthalene | 91-57-6 | 1.42E+02 | 5.18E-04 | 1.11E+01 | 1.07E+03 | 7.50E+00 | 1.01E+01 | 1.00E+00 | 2.87E-01 | 9.55E-01 | 5.73E-02 |
| Benzo(a)anthracene | 56-55-3 | 2.28E+02 | 1.20E-05 | 8.78E+00 | 8.42E+02 | 4.01E-01 | 5.42E-01 | 1.00E+00 | 1.79E-02 | 5.97E-02 | 3.58E-03 |
| Bis(2-chloroethyl)ether | 111-44-4 | 1.43E+02 | 1.70E-05 | 1.11E+01 | 1.06E+03 | 7.05E-01 | 9.53E-01 | 1.00E+00 | 3.13E-02 | 1.04E-01 | 6.25E-03 |
| Dibenzofuran | 132-64-9 | 1.68E+02 | 2.13E-04 | 1.02E+01 | 9.81E+02 | 4.70E+00 | 6.35E+00 | 1.00E+00 | 1.91E-01 | 6.36E-01 | 3.82E-02 |
| Hexachlorobenzene | 118-74-1 | 2.85E+02 | 1.70E-03 | 7.86E+00 | 7.54E+02 | 6.85E+00 | 9.26E+00 | 1.00E+00 | 2.65E-01 | 8.85E-01 | 5.31E-02 |
| Hexachlorocyclopentadiene | 77-47-4 | 2.73E+02 | 2.70E-02 | 8.03E+00 | 7.71E+02 | 7.96E+00 | 1.08E+01 | 1.00E+00 | 3.01E-01 | 1.00E+00 | 6.02E-02 |
| Hexachloroethane | 67-72-1 | 2.37E+02 | 3.89E-03 | 8.62E+00 | 8.27E+02 | 8.10E+00 | 1.09E+01 | 1.00E+00 | 3.06E-01 | 1.02E+00 | 6.11E-02 |
| Nitrobenzene | 98-95-3 | 1.23E+02 | 2.40E-05 | 1.20E+01 | 1.15E+03 | 1.05E+00 | 1.41E+00 | 1.00E+00 | 4.60E-02 | 1.53E-01 | 9.20E-03 |
| Pesticides | | | | | | | | | | | |
| Aldrin | 309-00-2 | 3.65E+02 | 4.40E-05 | 6.94E+00 | 6.66E+02 | 1.04E+00 | 1.40E+00 | 1.00E+00 | 4.57E-02 | 1.52E-01 | 9.13E-03 |
| Heptachlor | 76-44-8 | 3.73E+02 | 2.94E-04 | 6.87E+00 | 6.59E+02 | 3.71E+00 | 5.01E+00 | 1.00E+00 | 1.54E-01 | 5.13E-01 | 3.08E-02 |
| Heptachlor epoxide | 1024-57-3 | 3.89E+02 | 2.10E-05 | 6.72E+00 | 6.45E+02 | 5.20E-01 | 7.03E-01 | 1.00E+00 | 2.32E-02 | 7.72E-02 | 4.63E-03 |

Table A4-13
Modeled Groundwater-to-Vapor Concentrations while Showering
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Volatile Chemical of Potential Concern (Potable Use) | CASRN | MW (g/mol) | H (atm-$m^3$/mol) | $k_l$ (cm/hr) | $k_g$ (cm/hr) | $K_L$ (cm/hr) | $K_{aL}$ (cm/hr) | $C_w$ (1) (ug/L) | $C_{wd}$ (ug/L) | S (ug/$m^3$-min) | $C_a$ (ug/$m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | |
| Aroclor 1221 | 11104-28-2 | 1.89E+02 | 2.28E-04 | 9.66E+00 | 9.27E+02 | 4.60E+00 | 6.22E+00 | 1.00E+00 | 1.87E-01 | 6.24E-01 | 3.74E-02 |
| Aroclor 1232 | 11141-16-5 | 1.89E+02 | 7.36E-04 | 9.66E+00 | 9.27E+02 | 7.21E+00 | 9.73E+00 | 1.00E+00 | 2.77E-01 | 9.24E-01 | 5.54E-02 |
| Aroclor 1242 | 53469-21-9 | 2.92E+02 | 3.43E-04 | 7.76E+00 | 7.45E+02 | 4.49E+00 | 6.06E+00 | 1.00E+00 | 1.83E-01 | 6.10E-01 | 3.66E-02 |
| Aroclor 1248 | 12672-29-6 | 2.92E+02 | 4.40E-04 | 7.76E+00 | 7.45E+02 | 4.95E+00 | 6.68E+00 | 1.00E+00 | 2.00E-01 | 6.66E-01 | 3.99E-02 |
| Aroclor 1254 | 11097-69-1 | 3.26E+02 | 2.83E-04 | 7.34E+00 | 7.04E+02 | 3.90E+00 | 5.26E+00 | 1.00E+00 | 1.61E-01 | 5.36E-01 | 3.22E-02 |
| Aroclor 1260 | 11096-82-5 | 3.95E+02 | 3.36E-04 | 6.67E+00 | 6.40E+02 | 3.82E+00 | 5.16E+00 | 1.00E+00 | 1.58E-01 | 5.27E-01 | 3.16E-02 |
| Dioxins/Furans | | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | 2,3,7,8-TCDD TEQ | 3.22E+02 | 5.00E-05 | 7.39E+00 | 7.09E+02 | 1.23E+00 | 1.66E+00 | 1.00E+00 | 5.39E-02 | 1.80E-01 | 1.08E-02 |
| Cyanide | | | | | | | | | | | |
| Cyanide | 57-12-5 | 2.60E+01 | 1.01E-04 | 2.60E+01 | 2.50E+03 | 7.47E+00 | 1.01E+01 | 1.00E+00 | 2.86E-01 | 9.53E-01 | 5.72E-02 |
| Metals (Total) | | | | | | | | | | | |
| Mercury | 7439-97-6 | 2.72E+02 | 8.62E-03 | 8.05E+00 | 7.72E+02 | 7.82E+00 | 1.06E+01 | 1.00E+00 | 2.97E-01 | 9.90E-01 | 5.94E-02 |

Notes:
(1) A value of 1 ug/L is used to calculate a shower concentration for all possible COPCs. The Site/COPC specific groundwater EPC will be multiplied by the generic air concentration value to model shower air.
-- = Not Evaluated; only volatile chemicals evaluated
CASRN = Chemical Abstract Services Registry Number

Equations used for Foster-Chrostowski (1987) model

1) Derivation of Liquid-Film Mass Transfer Coefficient for the Shower Model

$$k_l = 20 * (44 / MW)^{0.5}$$

| Values | | |
|---|---|---|
| calc | $k_l$ | Liquid-film mass transfer coefficient (cm/hour) |
| 20 | | Liquid-film mass transfer coefficient for carbon dioxide (cm/hour) |
| 44 | | Conversion factor (molecular weight of carbon dioxide) |
| chem-specific | MW | Molecular Weight |

2) Derivation of Gas-Film Mass Transfer Coefficient for the Shower Model

$$k_g = 3000 * (18 / MW)^{0.5}$$

| Values | | |
|---|---|---|
| calc | $k_g$ | Gas-film mass transfer coefficient (cm/hour) |
| 3000 | | Gas-film mass transfer coefficient for water (cm/hour) |
| 18 | | Conversion factor (molecular weight of water) |
| chem-specific | MW | Molecular Weight |

3) Derivation of Overall Mass Transfer Coefficient Shower Model

$$K_L = [ 1/k_l + (R * T / (H * k_g)) ]^{-1}$$

| Values | | |
|---|---|---|
| calc | $K_L$ | Overall mass transfer coefficient (cm/hour) |
| calc | $k_l$ | Liquid-film mass transfer coefficient (cm/hour) |
| 8.2E-05 | R | Gas constant (atm-$m^3$/mol-K) |
| 293 | T | Room temperature (K) |
| chem-specific | H' | Henry's Law Constant (atm-$m^3$/mol) |
| calc | $k_g$ | Gas-film mass transfer coefficient (cm/hour) |

4) Derivation of Adjusted Overall Mass Transfer Coefficient Shower Model

$$K_{aL} = K_L * [ (T_1 * \mu_s) / (T_s * \mu_1) ]^{-0.5}$$

Values

5) Derivation of Concentration Leaving Shower Droplet Shower Model

$$C_{wd} = C_0 * ( 1 - \exp [ (-K_{aL} * t_s) / (60 * d) ] )$$

| Values | | |
|---|---|---|
| calc | $C_{wd}$ | Concentration leaving shower droplet after time $t_s$ (µg/L) |
| chem-specific | $C_0$ | Initial concentration in tap water (µg/L) |
| calc | $K_{aL}$ | Adjusted overall mass transfer coefficient (cm/hour) |
| 2 | $t_s$ | Shower droplet drop time (sec) |
| 60 | | Interficial area for droplet multiplied by conversion factors |
| 1 | d | Shower droplet diameter (mm) |

6) Derivation of VOC in Air Generation Rate Shower Model

$$S = ( C_{wd} * FR ) / SV$$

| Values | | |
|---|---|---|
| calc | S | VOC in air generation rate (µg/$m^3$-min) |
| calc | $C_{wd}$ | Concentration leaving shower droplet after time $t_s$ (µg/L) |
| 20 | FR | Shower water flow rate (L/min) |
| 6 | SV | Shower room air volume ($m^3$) |

7) Derivation of VOC Concentration in Shower Room Shower Model

$$C_a = ( S / Ra )$$

| Values | | |
|---|---|---|
| calc | $C_a$ | VOC concentration in shower room air (µg/$m^3$) |
| calc | S | VOC in air generation rate (µg/$m^3$-min) |
| 0.016666667 | Ra | Air exchange rate (1/min) |
| 0.001 L/$m^3$ | CF | Conversion factor |

Table A4-13
Modeled Groundwater-to-Vapor Concentrations while Showering
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Groundwater Volatile Chemical of Potential Concern (Potable Use) | CASRN | MW (g/mol) | H (atm-$m^3$/mol) | $k_l$ (cm/hr) | $k_g$ (cm/hr) | $K_L$ (cm/hr) | $K_{aL}$ (cm/hr) | $C_w$ [(1)] (ug/L) | $C_{wd}$ (ug/L) | S (ug/$m^3$-min) | $C_a$ (ug/$m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|

| | | |
|---|---|---|
| calc | $K_{aL}$ | Adjusted overall mass transfer coefficient (cm/hour) |
| calc | $K_L$ | Overall mass transfer coefficient (cm/hour) |
| 293 | $T_1$ | Calibration (room) temperature (K) |
| 0.596 | $\mu_s$ | Water viscosity at temperature $T_s$ [centipoise (cp)] |
| 318 | $T_s$ | Shower water temperature (K) |
| 1.002 | $\mu_1$ | Water viscosity at temperature T (cp) |

References:

Foster and Chrostowski. 1987. Inhalation Exposures to Volatile Organic Contaminants in the Shower." S.A. Foster and P.C. Chrostowski Presentation at the 80th annual Meeting of the Air Pollution Control Association.

Table A4-14
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

# Site-specific VISL Results
# Resident Equation Inputs

*** Inputted values different from Resident defaults are highlighted.**
Output generated 15DEC2020:15:38:24

| Variable | Resident Air Default Value | Form-Input Value |
|---|---|---|
| $AF_{gw}$ (Attenuation Factor Groundwater) unitless | 0.001 | 0.001 |
| $AF_{ss}$ (Attenuation Factor Sub-Slab) unitless | 0.03 | 0.03 |
| $ED_{res}$ (exposure duration) years | 26 | 26 |
| $ED_{0-2}$ (mutagenic exposure duration first phase) years | 2 | 2 |
| $ED_{2-6}$ (mutagenic exposure duration second phase) years | 4 | 4 |
| $ED_{6-16}$ (mutagenic exposure duration third phase) years | 10 | 10 |
| $ED_{16-26}$ (mutagenic exposure duration fourth phase) years | 10 | 10 |
| $EF_{res}$ (exposure frequency) days/year | 350 | 350 |
| $EF_{0-2}$ (mutagenic exposure frequency first phase) days/year | 350 | 350 |
| $EF_{2-6}$ (mutagenic exposure frequency second phase) days/year | 350 | 350 |
| $EF_{6-16}$ (mutagenic exposure frequency third phase) days/year | 350 | 350 |
| $EF_{16-26}$ (mutagenic exposure frequency fourth phase) days/year | 350 | 350 |
| $ET_{res}$ (exposure time) hours/day | 24 | 24 |
| $ET_{0-2}$ (mutagenic exposure time first phase) hours/day | 24 | 24 |
| $ET_{2-6}$ (mutagenic exposure time second phase) hours/day | 24 | 24 |
| $ET_{6-16}$ (mutagenic exposure time third phase) hours/day | 24 | 24 |
| $ET_{16-26}$ (mutagenic exposure time fourth phase) hours/day | 24 | 24 |
| THQ (target hazard quotient) unitless | 0.1 | 0.1 |
| LT (lifetime) years | 70 | 70 |
| TR (target risk) unitless | 0.000001 | 0.000001 |

Table A4-14
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

# Resident Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

| Chemical | CAS Number | Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1) | Does the chemical have inhalation toxicity data? (IUR and/or RfC) | Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Soil Source? ($C_{vp}$ > $C_{i,a}$,Target?) | Is Chemical Sufficiently Volatile and Toxic to Pose Inhalation Risk Via Vapor Intrusion from Groundwater Source? ($C_{hc}$ > $C_{i,a}$,Target?) | Target Indoor Air Concentration (TCR=1E-06 or THQ=0.1) MIN($C_{ia,c}$,$C_{ia,nc}$) (µg/m$^3$) | Toxicity Basis | Target Sub-Slab and Near-source Soil Gas Concentration (TCR=1E-06 or THQ=0.1) $C_{sg}$,Target (µg/m$^3$) | Target Groundwater Concentration (TCR=1E-06 or THQ=0.1) $C_{gw}$,Target (µg/L) | Is Target Groundwater Concentration < MCL? ($C_{gw}$ < MCL?) |
|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | Yes | Yes | Yes | Yes | 0.36 | CA | 12 | 1.59 | Yes (5) |
| Biphenyl, 1,1'- | 92-52-4 | Yes | Yes | Yes | Yes | 0.0417 | NC | 1.39 | 3.31 | -- |
| Cumene | 98-82-8 | Yes | Yes | Yes | Yes | 41.7 | NC | 1390 | 88.7 | -- |
| Cyclohexane | 110-82-7 | Yes | Yes | Yes | Yes | 626 | NC | 20900 | 102 | -- |
| Dichloroethane, 1,2- | 107-06-2 | Yes | Yes | Yes | Yes | 0.108 | CA | 3.6 | 2.24 | Yes (5) |
| Ethylbenzene | 100-41-4 | Yes | Yes | Yes | Yes | 1.12 | CA | 37.4 | 3.49 | Yes (700) |
| Methylcyclohexane | 108-87-2 | Yes | No | No Inhal. Tox. Info | No Inhal. Tox. Info | | | | | |
| Mercury (elemental) | 7439-97-6 | Yes | Yes | Yes | Yes | 0.0313 | NC | 1.04 | 0.0889 | Yes (2) |
| Naphthalene | 91-20-3 | Yes | Yes | Yes | Yes | 0.0826 | CA | 2.75 | 4.59 | -- |
| Tetrachloroethylene | 127-18-4 | Yes | Yes | Yes | Yes | 4.17 | NC | 139 | 5.76 | No (5) |
| Toluene | 108-88-3 | Yes | Yes | Yes | Yes | 521 | NC | 17400 | 1920 | No (1000) |
| Trichloroethylene | 79-01-6 | Yes | Yes | Yes | Yes | 0.209 | NC | 6.95 | 0.518 | Yes (5) |
| Xylenes | 1330-20-7 | Yes | Yes | Yes | Yes | 10.4 | NC | 348 | 38.5 | Yes (10000) |

# Resident Vapor Intrusion Screening Levels (VISL)

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = DWSHA; W = TEF applied; E = RPF applied; U = user provided; G = see RSL User's Guide Section 5; CA = cancer; NC = noncancer.

| Chemical | CAS Number | Pure Phase Vapor Concentration $C_{vp}$ (25 °C) ($\mu g/m^3$) | Maximum Groundwater Vapor Concentration $C_{hc}$ ($\mu g/m^3$) | Temperature for Maximum Groundwater Vapor Concentration (°C) | Lower Explosive Limit LEL (% by volume) | LEL Ref | IUR ($ug/m^3)^{-1}$ | IUR Ref | RfC ($mg/m^3$) | RfC Ref | Mutagenic Indicator | Carcinogenic VISL TCR=1E-06 $C_{ia,c}$ ($\mu g/m^3$) | Noncarcinogenic VISL THQ=0.1 $C_{ia,nc}$ ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 398000000 | 406000000 | 25 | 1.2 | CRC89 | 0.0000078 | I | 0.03 | I | No | 0.36 | 3.13 |
| Biphenyl, 1,1'- | 92-52-4 | 74100 | 94200 | 25 | 0.6 | CRC89 | | | 0.0004 | X | No | | 0.0417 |
| Cumene | 98-82-8 | 29100000 | 28800000 | 25 | 0.9 | CRC89 | | | 0.4 | I | No | | 41.7 |
| Cyclohexane | 110-82-7 | 438000000 | 337000000 | 25 | 1.3 | CRC89 | | | 6 | I | No | | 626 |
| Dichloroethane, 1,2- | 107-06-2 | 420000000 | 415000000 | 25 | 6.2 | CRC89 | 0.000026 | I | 0.007 | P | No | 0.108 | 0.73 |
| Ethylbenzene | 100-41-4 | 54800000 | 54400000 | 25 | 0.8 | CRC89 | 0.0000025 | C | 1 | I | No | 1.12 | 104 |
| Methylcyclohexane | 108-87-2 | 243000000 | 246000000 | 25 | 1.2 | CRC89 | | | | | No | | |
| Mercury (elemental) | 7439-97-6 | 21100 | 21100 | 25 | | | | | 0.0003 | I | No | | 0.0313 |
| Naphthalene | 91-20-3 | 586000 | 558000 | 25 | 0.9 | CRC89 | 0.000034 | C | 0.003 | I | No | 0.0826 | 0.313 |
| Tetrachloroethylene | 127-18-4 | 165000000 | 149000000 | 25 | | | 0.00000026 | I | 0.04 | I | No | 10.8 | 4.17 |
| Toluene | 108-88-3 | 141000000 | 143000000 | 25 | 1.1 | CRC89 | | | 5 | I | No | | 521 |
| Trichloroethylene | 79-01-6 | 488000000 | 515000000 | 25 | 8 | CRC89 | 0.0000041 | I | 0.002 | I | Mut | 0.478 | 0.209 |
| Xylenes | 1330-20-7 | 45600000 | 28700000 | 25 | | | | | 0.1 | I | No | | 10.4 |

Table A4-14
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

# Resident Vapor Intrusion Risk

Output generated 15DEC2020:15:38:24

| Chemical | CAS Number | Site Groundwater Concentration $C_{gw}$ (µg/L) | Site Indoor Air Concentration $C_{i,a}$ (µg/m$^3$) | VI Carcinogenic Risk CDI (µg/m$^3$) | VI Carcinogenic Risk CR | VI Hazard CDI (mg/m$^3$) | VI Hazard HQ | IUR (ug/m$^3$)$^{-1}$ | IUR Ref | Chronic RfC (mg/m$^3$) | RfC Ref | Temperature (°C) for Groundwater Vapor Concentration | Mutagen? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | 2100 | 476 | 170 | 0.00132 | 0.457 | 15.2 | 7.8E-06 | I | 0.03 | IRIS | 25 | No |
| Biphenyl, 1,1'- | 92-52-4 | 5.5 | 0.0693 | 0.0247 | | 6.64E-05 | 0.166 | | | 0.0004 | SCREEN | 25 | No |
| Cumene | 98-82-8 | 91 | 42.8 | 15.2 | | 0.041 | 0.103 | | | 0.4 | IRIS | 25 | No |
| Cyclohexane | 110-82-7 | 490 | 3000 | 1070 | | 2.88 | 0.48 | | | 6 | IRIS | 25 | No |
| Dichloroethane, 1,2- | 107-06-2 | 17.6 | 0.849 | 0.302 | 0.00000786 | 0.000814 | 0.116 | 0.000026 | I | 0.007 | PPRTV | 25 | No |
| Ethylbenzene | 100-41-4 | 1300 | 419 | 149 | 0.000373 | 0.402 | 0.402 | 2.5E-06 | C | 1 | IRIS | 25 | No |
| Methylcyclohexane | 108-87-2 | 440 | | | | | | | | | | 25 | No |
| Mercury (elemental) | 7439-97-6 | 0.3 | 0.106 | 0.0376 | | 0.000101 | 0.338 | | | 0.0003 | IRIS | 25 | No |
| Naphthalene | 91-20-3 | 120 | 2.16 | 0.769 | 0.0000261 | 0.00207 | 0.69 | 0.000034 | C | 0.003 | IRIS | 25 | No |
| Tetrachloroethylene | 127-18-4 | 14 | 10.1 | 3.61 | 0.000000938 | 0.00971 | 0.243 | 2.6E-07 | I | 0.04 | IRIS | 25 | No |
| Toluene | 108-88-3 | 9800 | 2660 | 948 | | 2.55 | 0.51 | | | 5 | IRIS | 25 | No |
| Trichloroethylene | 79-01-6 | 3.6 | 1.45 | 0.739 | 0.00000303 | 0.00139 | 0.695 | 4.1E-06 | I | 0.002 | IRIS | 25 | Mut |
| Xylenes | 1330-20-7 | 4800 | 1300 | 463 | | 1.25 | 12.5 | | | 0.1 | IRIS | 25 | No |
| *Sum | | | | | 0.00173 | | 31.4 | | | | | | |

Table A4-14
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

# Chemical Properties

Output generated 15DEC2020:15:38:24

| Chemical | CAS Number | Does the chemical meet the definition for volatility? (HLC>1E-5 or VP>1) | Does the chemical have inhalation toxicity data? (IUR and/or RfC) | MW | MW Ref | Vapor Pressure VP (mm Hg) | VP Ref | S (mg/L) | S Ref | MCL (ug/L) | HLC (atm-$m^3$/mole) | Henry's Law Constant (unitless) | H` and HLC Ref | Henry's Law Constant Used in Calcs (unitless) | Normal Boiling Point BP (K) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | Yes | Yes | 78.12 | PHYSPROP | 94.8 | PHYSPROP | 1790 | PHYSPROP | 5 | 0.00555 | 0.227 | PHYSPROP | 0.227 | 353.15 |
| Biphenyl, 1,1'- | 92-52-4 | Yes | Yes | 154.21 | PHYSPROP | 0.00893 | PHYSPROP | 7.48 | PHYSPROP | | 0.000308 | 0.0126 | PHYSPROP | 0.0126 | 529.25 |
| Cumene | 98-82-8 | Yes | Yes | 120.2 | PHYSPROP | 4.5 | PHYSPROP | 61.3 | PHYSPROP | | 0.0115 | 0.47 | PHYSPROP | 0.47 | 425.55 |
| Cyclohexane | 110-82-7 | Yes | Yes | 84.16 | PHYSPROP | 96.9 | PHYSPROP | 55 | PHYSPROP | | 0.15 | 6.13 | PHYSPROP | 6.13 | 353.85 |
| Dichloroethane, 1,2- | 107-06-2 | Yes | Yes | 98.96 | PHYSPROP | 78.9 | PHYSPROP | 8600 | PHYSPROP | 5 | 0.00118 | 0.0482 | PHYSPROP | 0.0482 | 356.65 |
| Ethylbenzene | 100-41-4 | Yes | Yes | 106.17 | PHYSPROP | 9.6 | PHYSPROP | 169 | PHYSPROP | 700 | 0.00788 | 0.322 | PHYSPROP | 0.322 | 409.25 |
| Methylcyclohexane | 108-87-2 | Yes | No | 98.19 | PHYSPROP | 46 | PHYSPROP | 14 | PHYSPROP | | 0.43 | 17.6 | PHYSPROP | 17.6 | 374.05 |
| Mercury (elemental) | 7439-97-6 | Yes | Yes | 200.59 | PHYSPROP | 0.00196 | PHYSPROP | 0.06 | PHYSPROP | 2 | 0.00862 | 0.352 | PHYSPROP VP/S | 0.352 | 629.75 |
| Naphthalene | 91-20-3 | Yes | Yes | 128.18 | PHYSPROP | 0.085 | PHYSPROP | 31 | PHYSPROP | | 0.00044 | 0.018 | PHYSPROP | 0.018 | 491.05 |
| Tetrachloroethylene | 127-18-4 | Yes | Yes | 165.83 | PHYSPROP | 18.5 | PHYSPROP | 206 | PHYSPROP | 5 | 0.0177 | 0.724 | PHYSPROP | 0.724 | 394.45 |
| Toluene | 108-88-3 | Yes | Yes | 92.14 | PHYSPROP | 28.4 | PHYSPROP | 526 | PHYSPROP | 1000 | 0.00664 | 0.271 | PHYSPROP | 0.271 | 383.75 |
| Trichloroethylene | 79-01-6 | Yes | Yes | 131.39 | PHYSPROP | 69 | PHYSPROP | 1280 | PHYSPROP | 5 | 0.00985 | 0.403 | PHYSPROP | 0.403 | 360.35 |
| Xylenes | 1330-20-7 | Yes | Yes | 106.17 | PHYSPROP | 7.99 | PHYSPROP | 106 | PHYSPROP | 10000 | 0.00663 | 0.271 | PHYSPROP | 0.271 | 411.65 |

Table A4-14
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

# Chemical Properties

Output generated 15DEC2020:15:38:24

| Chemical | CAS Number | BP Ref | Critical Temperature TC (K) | TC Ref | Enthalpy of vaporization at the normal boiling point $\Delta H_{v,b}$ (cal/mol) | $\Delta H_{v,b}$ Ref | Lower Explosive Limit LEL (% by volume) | LEL Ref |
|---|---|---|---|---|---|---|---|---|
| Benzene | 71-43-2 | PHYSPROP | 562 | CRC89 | 7342.26 | CRC89 | 1.2 | CRC89 |
| Biphenyl, 1,1'- | 92-52-4 | PHYSPROP | 773 | CRC89 | 10890 | DECHEMA | 0.6 | CRC89 |
| Cumene | 98-82-8 | PHYSPROP | 631 | CRC89 | 10335.3 | TOXNET | 0.9 | CRC89 |
| Cyclohexane | 110-82-7 | PHYSPROP | 553 | CRC89 | 7163 | CRC89 | 1.3 | CRC89 |
| Dichloroethane, 1,2- | 107-06-2 | PHYSPROP | 562 | CRC89 | 7643.4 | CRC89 | 6.2 | CRC89 |
| Ethylbenzene | 100-41-4 | PHYSPROP | 617 | CRC89 | 8501.43 | CRC89 | 0.8 | CRC89 |
| Methylcyclohexane | 108-87-2 | PHYSPROP | 572 | CRC89 | 7473.71 | CRC89 | 1.2 | CRC89 |
| Mercury (elemental) | 7439-97-6 | PHYSPROP | 1760 | CRC89 | 14127.63 | CRC89 | | |
| Naphthalene | 91-20-3 | PHYSPROP | 748 | CRC89 | 10373 | Weast | 0.9 | CRC89 |
| Tetrachloroethylene | 127-18-4 | PHYSPROP | 620 | YAWS | 8288 | Weast | | |
| Toluene | 108-88-3 | PHYSPROP | 592 | CRC89 | 7930 | Weast | 1.1 | CRC89 |
| Trichloroethylene | 79-01-6 | PHYSPROP | 571 | YAWS | 7505 | Weast | 8 | CRC89 |
| Xylenes | 1330-20-7 | PHYSPROP | 620 | YAWS | 8523 | Weast | | |

**Table A4-15**
**Adult Lead Methodology Model Parameters**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Variable | Description of Variable | Units | Model Input Values | Notes |
|---|---|---|---|---|
| **General Parameters** | | | | |
| PbS | Lead exposure point concentration (mean) | mg/kg | Central AOC<br>TS = 394.6<br>Southern AOC<br>SS = 524.7<br>TS = 1437 | a |
| $R_{fetal/maternal}$ | Fetal/maternal lead blood (PbB) ratio | unitless | 0.9 | b |
| BKSF | Biokinetic Slope Factor | µg/dL per µg/day | 0.4 | |
| $GSD_i$ | Geometric standard deviation PbB | unitless | 1.8 | |
| $PbB_0$ | Baseline PbB concentration | µg/dL | 0.6 | |
| $AF_{S, D}$ | Absorption fraction (same for soil and dust) | unitless | 0.12 | |
| PbBt | Target PbB level of concern | µg/dL | 5 | CDC, 2012 |
| **Receptor-Specific Parameters** | | | | |
| $IR_{S, D}$ | **Soil ingestion rate (including soil-derived indoor dust)** | | | |
| | Current/Future Outdoor Worker | grams/day | 0.05 | c |
| | Future Construction Worker | grams/day | 0.1 | d |
| | Current/Future Teen Trespasser | grams/day | 0.1 | d |
| $EF_{S, D}$ | **Exposure frequency (same for soil and dust)** | | | |
| | Current/Future Outdoor Worker | days/year | 219 | b |
| | Future Construction Worker | days/year | 219 | b |
| | Current/Future Teen Trespasser | days/year | 24 | e |
| $AT_{S, D}$ | **Averaging time (same for soil and dust)** | | | |
| | Current/Future Outdoor Worker | days/year | 365 | b |
| | Future Construction Worker | days/year | 365 | b |
| | Current/Future Teen Trespasser | days/year | 90 | f |

**Notes:**

[a] See Attachment 3 for mean EPC calculations
[b] EPA (2017) ALM default
[c] EPA (2017) recommends 50 mg/day as a plausible central tendency value for non-contact-intensive activities.
[d] EPA (2018) recommends 100 mg/day as a soil ingestion rate for the contact-intense worker and young adult exposure.
[e] Teen Trespasser visits the site 24 days/year.
[f] EPA (2003): Minimum exposure period of 90 days/year for intermittent and variable exposure.

ALM = Adult Lead Methodology
B = blood
DU = decision unit
Pb = lead
PbB = blood-lead concentration
EPA = U.S. Environmental Protection Agency
µg/dL = micrograms per deciliter
µg/day = micrograms per day
mg/kg = milligrams per kilogram

**References:**


CDC. 2012. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. Report of the Advisory Committee on Childhood Lead Poisoning Prevention, Centers for Disease Control and Prevention. January 4, 2012.
EPA. 2003. Assessing Intermittent or Variable Exposures at Lead Sites. OSWER #9285.7-76. November 2003.
EPA, 2017. Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters.
EPA. 2018. Lead at Superfund Sites: Frequent Questions from Risk Assessors on the Adult Lead Methodology. Last updated June 4, 2018.

**Table A4-16**
**Adult Lead Methodology Model Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Variable | Description of Variable (1) | Units | Central AOC, Total Soil | | | Southern AOC, Surface Soil | | Southern AOC, Total Soil | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Outdoor Worker Scenario | Construction Worker Scenario | Trespasser Scenario | Outdoor Worker Scenario | Trespasser Scenario | Outdoor Worker Scenario | Construction Worker Scenario | Trespasser Scenario |
| PbS | Soil/sediment lead concentration | µg/g or ppm | 394.6 | 394.6 | 394.6 | 524.7 | 524.7 | 1437 | 1437 | 1437 |
| Rfetal/maternal | Fetal/maternal PbB ratio | -- | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| BKSF | Biokinetic Slope Factor | µg/dL per µg/day | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| GSDi | Geometric standard deviation PbB | -- | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| PbB0 | Baseline PbB | µg/dL | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| IRS | Soil ingestion rate (including soil-derived indoor dust) | g/day | 0.05 | 0.10 | 0.10 | 0.05 | 0.10 | 0.05 | 0.10 | 0.10 |
| AFS, D | Absorption fraction (same for soil and dust) | -- | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| EFS, D | Exposure frequency (same for soil and dust) | days/yr | 219 | 219 | 24 | 219 | 24 | 219 | 219 | 24 |
| ATS, D | Averaging time (same for soil and dust) | days/yr | 365 | 365 | 90 | 365 | 90 | 365 | 365 | 90 |
| PbBadult | PbB of adult worker, geometric mean | µg/dL | 1.2 | 1.7 | 1.1 | 1.4 | 1.3 | 2.7 | 4.7 | 2.4 |
| PbBfetal, 0.95 | 95th percentile PbB among fetuses of adult workers | µg/dL | 2.8 | 4.1 | 2.6 | 3.2 | 3.0 | 6.3 | 11.2 | 5.8 |
| PbBt | Target PbB level of concern (e.g., 2-8 ug/dL) | µg/dL | **5.0** | **5.0** | **5.0** | **5.0** | **5.0** | **5.0** | **5.0** | **5.0** |
| **P(PbBfetal > PbBt)** | **Probability that fetal PbB exceeds target PbB, assuming lognormal distribution** | **%** | **0.4%** | **3%** | **0.3%** | **0.8%** | **0.6%** | **11%** | **39%** | **8%** |

**Notes:**
(1) Risk results were derived using NHANES 2009-2014 data. See **Table A4-15** for variable sources.
days/yr = days per year
g/day = grams per day
ISM = incremental sampling methodology
µg/dL = micrograms per deciliter
µg/day = micrograms per day
µg/g = micrograms per gram
ppm = parts per million
PbB = blood-lead concentration

**Table A4-17**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Surface Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Lead Site-Specific Information for the Child Resident Scenario | | | |
|---|---|---|---|
| **Area** | **Medium** | **EPC Value** | **Units** |
| Southern AOC | Soil | 524.7 | mg/kg |

| IEUBK Model Parameters | | Value | Units |
|---|---|---|---|
| Indoor air lead concentration (% of outdoor) | | 30 [a] | % |
| **AIR (by year)** | | | |
| Air Concentration | | | |
| Age (years) = | 0 - 7 | 0.10 [a] | µg/m$^3$ |
| Time Outdoors | | | |
| Age (years) = | 0 - 1 | 1 [a] | hours/day |
| | 1 - 2 | 2 [a] | hours/day |
| | 2 - 3 | 3 [a] | hours/day |
| | 3 - 7 | 4 [a] | hours/day |
| Ventilation Rate | | | |
| Age (years) = | 0 - 1 | 2 [a] | m$^3$/day |
| | 1 - 2 | 3 [a] | m$^3$/day |
| | 2 - 5 | 5 [a] | m$^3$/day |
| | 5 - 7 | 7 [a] | m$^3$/day |
| Lung Absorption | | 32 [a] | % |

**Table A4-17**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Surface Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| DIET (by year) | | | |
|---|---|---|---|
| Dietary Lead Intake | | | |
| Age (years) = | 0 - 1 | 2.26 [a] | µg Pb/day |
| | 1 - 2 | 1.96 [a] | µg Pb/day |
| | 2 - 3 | 2.13 [a] | µg Pb/day |
| | 3 - 4 | 2.04 [a] | µg Pb/day |
| | 4 - 5 | 1.95 [a] | µg Pb/day |
| | 5 - 6 | 2.05 [a] | µg Pb/day |
| | 6 - 7 | 2.22 [a] | µg Pb/day |
| **ALTERNATE DIET SOURCES (by food class)** | | | |
| Concentration: | | | |
| | home-grown fruits | 0 [a] | µg Pb/g |
| | home-grown vegetables | 0 [a] | µg Pb/g |
| | fish from fishing | 0 [a] | µg Pb/g |
| | game animals from hunting | 0 [a] | µg Pb/g |
| Percent of food class: | | | |
| | home-grown fruits | 0 [a] | % |
| | home-grown vegetables | 0 [a] | % |
| | fish from fishing | 0 [a] | % |
| | game animals from hunting | 0 [a] | % |

**Table A4-17**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Surface Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **DRINKING WATER** | | | |
| Lead Concentration in drinking water | | 10.7 | µg/L |
| Ingestion rate: | | | |
| Age (years) = | 0 - 1 | 0.20 [a] | L/day |
| | 1 - 2 | 0.50 [a] | L/day |
| | 2 - 3 | 0.52 [a] | L/day |
| | 3 - 4 | 0.53 [a] | L/day |
| | 4 - 5 | 0.55 [a] | L/day |
| | 5 - 6 | 0.58 [a] | L/day |
| | 6 - 7 | 0.59 [a] | L/day |
| **SOIL/DUST INGESTION** | | | |
| Concentration: | | Soil | |
| | soil | 288 [a] | µg/g |
| | dust | 200 [a] | µg/g |
| Soil/dust ingestion weighting factor (% soil) | | 45 [a] | % |
| Soil/dust ingestion: | | | |
| Age (years) = | 0 - 1 | 0.085 [a] | g/day |
| | 1 - 4 | 0.135 [a] | g/day |
| | 4 - 5 | 0.100 [a] | g/day |
| | 5 - 6 | 0.090 [a] | g/day |
| | 6 - 7 | 0.085 [a] | g/day |
| **SOIL/DUST MULTIPLE SOURCE ANALYSIS** | | | |
| Fraction of indoor dust lead attributable to soil | | 0.70 [a] | unitless |
| Ratio of dust lead concentration to outdoor air lead concentration | | 100 [a] | µg Pb/g dust per µg Pb/$m^3$ air |

**Table A4-17**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Surface Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **BIOAVAILABILITY FOR GUT ABSORPTION PATHWAYS** | | | |
| Total lead absorption (at low intake): | | Surface Soil | |
| | diet | 50 [a] | % |
| | drinking water | 50 [a] | % |
| | soil | 30 [a] | % |
| | dust | 30 [a] | % |
| | alternate source | 0 [a] | % |
| **BIOAVAILABILITY FOR GUT ABSORPTION PATHWAYS (continued)** | | | |
| Fraction of total net absorption at low intake rate that is attributable to non-saturable (passive) processes | | 0.2 [a] | unitless |
| **ALTERNATE SOURCES OF LEAD** | | | |
| Total lead intake: | | Soil | |
| | Age (years) = 0 - 7 | 0 [a] | µg/day |
| **MATERNAL-TO-NEWBORN LEAD EXPOSURE** | | | |
| Mothers blood lead concentration at childbirth | | 0.6 [a] | µg/dL |
| **PLOTTING AND RISK ESTIMATION** | | | |
| Geometric standard deviation (GSD) for blood lead | | 1.6 [a] | unitless |
| Blood lead level (BLL) of concern | | 5 [a] | µg/dL |
| **COMPUTATION OPTIONS** | | | |
| Iteration time step for numerical integration | | 4 [a] | hours |
| **PROBABILITY DISTRIBUTION PERCENT RESULTS** | | | |
| Geometric mean | | 4.901 Calc | unitless |
| Age Range | | 12-72 [a] | months |
| Percent above allowable BLL | | 48.301 Calc | % |

**Table A4-17**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Surface Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

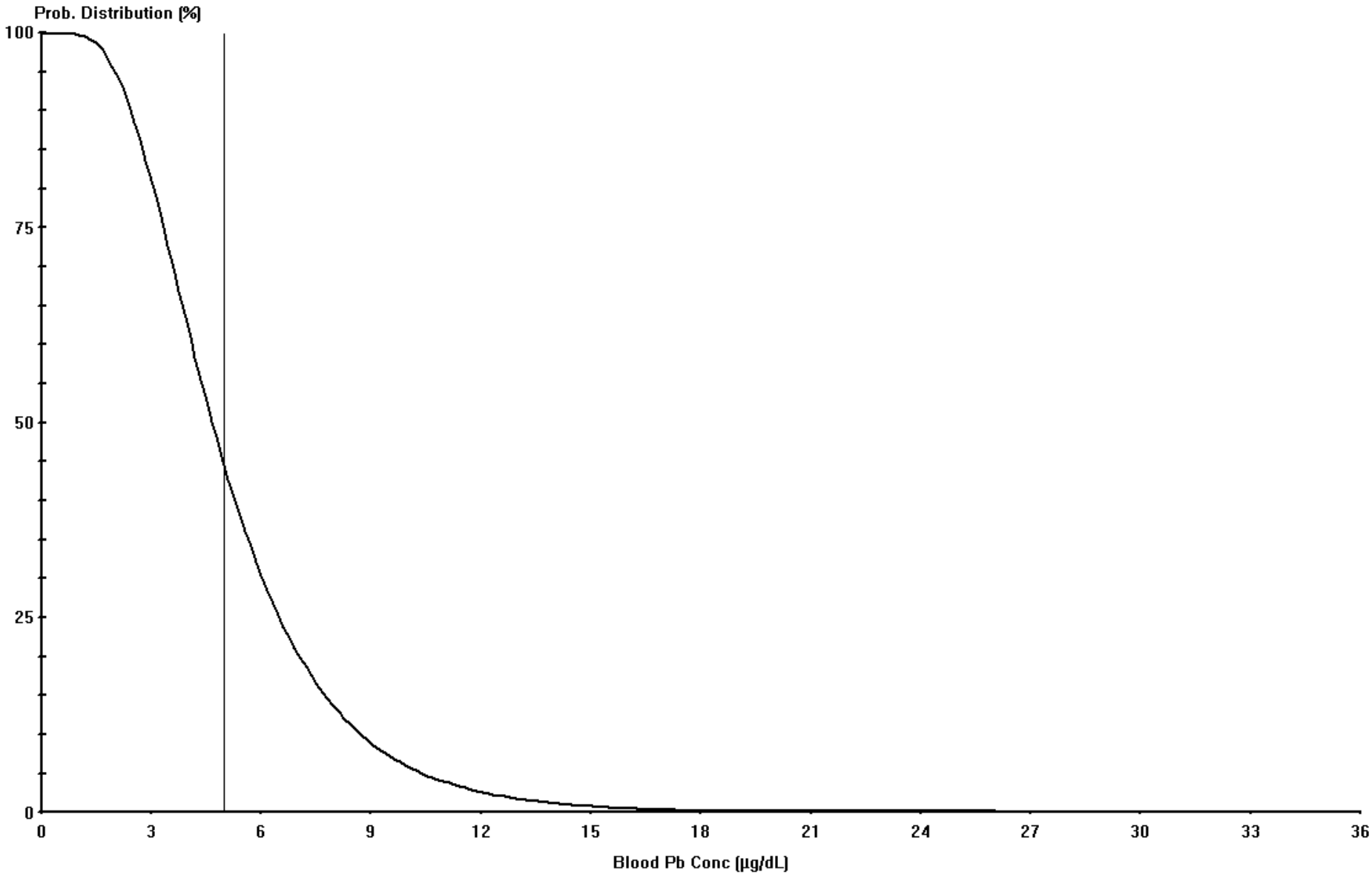
**Notes:**

[1] Young child = 0 - 7 years of age (12 - 72 months) (EPA 2021b).
[a] IEUBK model default value (EPA 2021a and 2021b).

L/day = liters per day
Pb = lead
µg/$m^3$ = micrograms per cubic meter
µg/dL = micrograms per deciliter
µg/g = micrograms per gram
mg/kg = milligrams per kilogram

**References:**

EPA 2021a. Integrated Exposure Uptake Biokinetic Model for Lead in Children, Windows® version (IEUBKwinv2 build 1.66) Dated May 2021.
EPA 2021b. User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows® version 2 (Updated May 2021). The Technical Review Workgroup (TRW) Lead Committee.




Cutoff = 5.000 µg/dl
Geo Mean = 4.901
GSD = 1.600
% Above = 48.301

Age Range = 12 to 72 months

Run Mode = Research
Comment = 524.7 mg/kg

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.
While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

**Table A4-18**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Lead Site-Specific Information for the Child Resident Scenario | | | |
|---|---|---|---|
| **Area** | **Medium** | **Value** | **Units** |
| Southern AOC | Soil | 1,437 | mg/kg |

| IEUBK Model Parameters | | Value | Units |
|---|---|---|---|
| Indoor air lead concentration (% of outdoor) | | 30 [a] | % |
| **AIR (by year)** | | | |
| Air Concentration | | | |
| Age (years) = | 0 - 7 | 0.10 [a] | µg/m$^3$ |
| Time Outdoors | | | |
| Age (years) = | 0 - 1 | 1 [a] | hours/day |
| | 1 - 2 | 2 [a] | hours/day |
| | 2 - 3 | 3 [a] | hours/day |
| | 3 - 7 | 4 [a] | hours/day |
| Ventilation Rate | | | |
| Age (years) = | 0 - 1 | 2 [a] | m$^3$/day |
| | 1 - 2 | 3 [a] | m$^3$/day |
| | 2 - 5 | 5 [a] | m$^3$/day |
| | 5 - 7 | 7 [a] | m$^3$/day |
| Lung Absorption | | 32 [a] | % |

**Table A4-18**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **DIET (by year)** | | | |
| Dietary Lead Intake | | | |
| Age (years) = | 0 - 1 | 2.26 [a] | µg Pb/day |
| | 1 - 2 | 1.96 [a] | µg Pb/day |
| | 2 - 3 | 2.13 [a] | µg Pb/day |
| | 3 - 4 | 2.04 [a] | µg Pb/day |
| | 4 - 5 | 1.95 [a] | µg Pb/day |
| | 5 - 6 | 2.05 [a] | µg Pb/day |
| | 6 - 7 | 2.22 [a] | µg Pb/day |
| **ALTERNATE DIET SOURCES (by food class)** | | | |
| Concentration: | | | |
| | home-grown fruits | 0 [a] | µg Pb/g |
| | home-grown vegetables | 0 [a] | µg Pb/g |
| | fish from fishing | 0 [a] | µg Pb/g |
| | game animals from hunting | 0 [a] | µg Pb/g |
| Percent of food class: | | | |
| | home-grown fruits | 0 [a] | % |
| | home-grown vegetables | 0 [a] | % |
| | fish from fishing | 0 [a] | % |
| | game animals from hunting | 0 [a] | % |

**Table A4-18**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **DRINKING WATER** | | | |
| Lead Concentration in drinking water | | 10.7 | µg/L |
| Ingestion rate: | | | |
| Age (years) = | 0 - 1 | 0.20 [a] | L/day |
| | 1 - 2 | 0.50 [a] | L/day |
| | 2 - 3 | 0.52 [a] | L/day |
| | 3 - 4 | 0.53 [a] | L/day |
| | 4 - 5 | 0.55 [a] | L/day |
| | 5 - 6 | 0.58 [a] | L/day |
| | 6 - 7 | 0.59 [a] | L/day |
| **SOIL/DUST INGESTION** | | | |
| Concentration: | | Soil | |
| | soil | 288 [a] | µg/g |
| | dust | 200 [a] | µg/g |
| Soil/dust ingestion weighting factor (% soil) | | 45 [a] | % |
| Soil/dust ingestion: | | | |
| Age (years) = | 0 - 1 | 0.085 [a] | g/day |
| | 1 - 4 | 0.135 [a] | g/day |
| | 4 - 5 | 0.100 [a] | g/day |
| | 5 - 6 | 0.090 [a] | g/day |
| | 6 - 7 | 0.085 [a] | g/day |
| **SOIL/DUST MULTIPLE SOURCE ANALYSIS** | | | |
| Fraction of indoor dust lead attributable to soil | | 0.70 [a] | unitless |
| Ratio of dust lead concentration to outdoor air lead concentration | | 100 [a] | µg Pb/g dust per µg Pb/$m^3$ air |

**Table A4-18**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **BIOAVAILABILITY FOR GUT ABSORPTION PATHWAYS** | | | |
| Total lead absorption (at low intake): | | Total Soil | |
| | diet | 50 [a] | % |
| | drinking water | 50 [a] | % |
| | soil | 30 [a] | % |
| | dust | 30 [a] | % |
| | alternate source | 0 [a] | % |
| **BIOAVAILABILITY FOR GUT ABSORPTION PATHWAYS (continued)** | | | |
| Fraction of total net absorption at low intake rate that is attributable to non-saturable (passive) processes | | 0.2 [a] | unitless |
| **ALTERNATE SOURCES OF LEAD** | | | |
| Total lead intake: | | Soil | |
| | Age (years) = 0 - 7 | 0 [a] | µg/day |
| **MATERNAL-TO-NEWBORN LEAD EXPOSURE** | | | |
| Mothers blood lead concentration at childbirth | | 0.6 [a] | µg/dL |
| **PLOTTING AND RISK ESTIMATION** | | | |
| Geometric standard deviation (GSD) for blood lead | | 1.6 [a] | unitless |
| Blood lead level (BLL) of concern | | 5 [a] | µg/dL |
| **COMPUTATION OPTIONS** | | | |
| Iteration time step for numerical integration | | 4 [a] | hours |
| **PROBABILITY DISTRIBUTION PERCENT RESULTS** | | | |
| Geometric mean | | 9.224 Calc | unitless |
| Age Range | | 12-72 [a] | months |
| Percent above allowable BLL | | 90.37 Calc | % |

**Table A4-18**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Southern AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

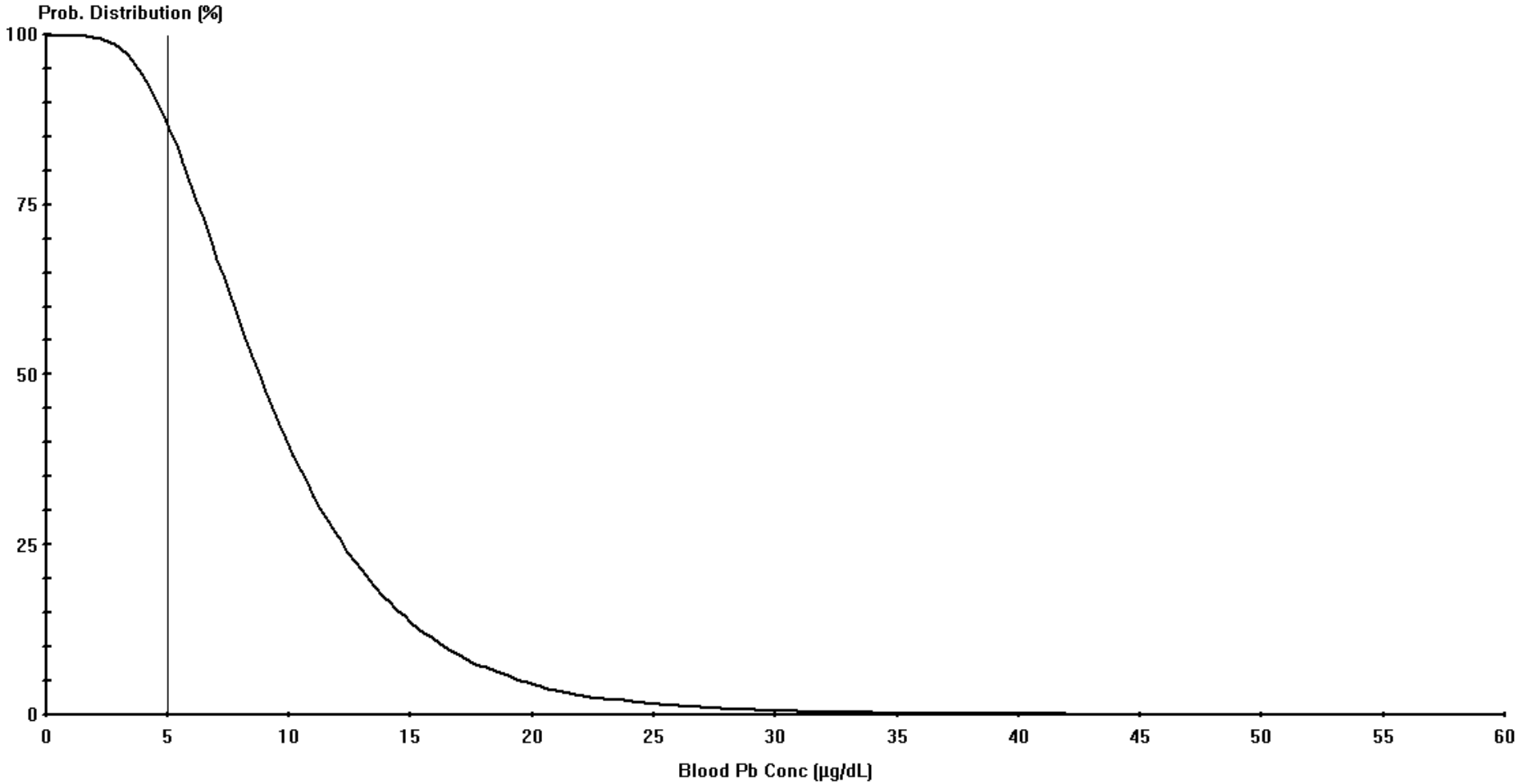
**Notes:**

[1] Young child = 0 - 7 years of age (12 - 72 months) (EPA 2021b).
[a] IEUBK model default value (EPA 2021a and 2021b).

L/day = liters per day
Pb = lead
$\mu g/m^3$ = micrograms per cubic meter
µg/dL = micrograms per deciliter
µg/g = micrograms per gram
mg/kg = milligrams per kilogram

**References:**

EPA 2021a. Integrated Exposure Uptake Biokinetic Model for Lead in Children, Windows® version (IEUBKwinv2 build 1.66) Dated May 2021.
EPA 2021b. User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows® version 2 (Updated May 2021). The Technical Review Workgroup (TRW) Lead Committee.




Cutoff = 5.000 µg/dl
Geo Mean = 9.224
GSD = 1.600
% Above = 90.370

Age Range = 12 to 72 months

Run Mode = Research
Comment = 1437 mg/kg

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.
While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

**Table A4-19**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Central AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Lead Site-Specific Information for the Child Resident Scenario | | | |
|---|---|---|---|
| **Area** | **Medium** | **Value** | **Units** |
| Central AOC | Soil | 394.6 | mg/kg |

| IEUBK Model Parameters | | Value | Units |
|---|---|---|---|
| Indoor air lead concentration (% of outdoor) | | 30 [a] | % |
| **AIR (by year)** | | | |
| Air Concentration | | | |
| Age (years) = | 0 - 7 | 0.10 [a] | µg/$m^3$ |
| Time Outdoors | | | |
| Age (years) = | 0 - 1 | 1 [a] | hours/day |
| | 1 - 2 | 2 [a] | hours/day |
| | 2 - 3 | 3 [a] | hours/day |
| | 3 - 7 | 4 [a] | hours/day |
| Ventilation Rate | | | |
| Age (years) = | 0 - 1 | 2 [a] | $m^3$/day |
| | 1 - 2 | 3 [a] | $m^3$/day |
| | 2 - 5 | 5 [a] | $m^3$/day |
| | 5 - 7 | 7 [a] | $m^3$/day |
| Lung Absorption | | 32 [a] | % |

**Table A4-19**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Central AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **DIET (by year)** | | | |
| Dietary Lead Intake | | | |
| Age (years) = | 0 - 1 | 2.26 [a] | µg Pb/day |
| | 1 - 2 | 1.96 [a] | µg Pb/day |
| | 2 - 3 | 2.13 [a] | µg Pb/day |
| | 3 - 4 | 2.04 [a] | µg Pb/day |
| | 4 - 5 | 1.95 [a] | µg Pb/day |
| | 5 - 6 | 2.05 [a] | µg Pb/day |
| | 6 - 7 | 2.22 [a] | µg Pb/day |
| **ALTERNATE DIET SOURCES (by food class)** | | | |
| Concentration: | | | |
| | home-grown fruits | 0 [a] | µg Pb/g |
| | home-grown vegetables | 0 [a] | µg Pb/g |
| | fish from fishing | 0 [a] | µg Pb/g |
| | game animals from hunting | 0 [a] | µg Pb/g |
| Percent of food class: | | | |
| | home-grown fruits | 0 [a] | % |
| | home-grown vegetables | 0 [a] | % |
| | fish from fishing | 0 [a] | % |
| | game animals from hunting | 0 [a] | % |

**Table A4-19**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Central AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **DRINKING WATER** | | | |
| Lead Concentration in drinking water | | 10.7 | µg/L |
| Ingestion rate: | | | |
| Age (years) = | 0 - 1 | 0.20 [a] | L/day |
| | 1 - 2 | 0.50 [a] | L/day |
| | 2 - 3 | 0.52 [a] | L/day |
| | 3 - 4 | 0.53 [a] | L/day |
| | 4 - 5 | 0.55 [a] | L/day |
| | 5 - 6 | 0.58 [a] | L/day |
| | 6 - 7 | 0.59 [a] | L/day |
| **SOIL/DUST INGESTION** | | | |
| Concentration: | | Soil | |
| | soil | 288 [a] | µg/g |
| | dust | 200 [a] | µg/g |
| Soil/dust ingestion weighting factor (% soil) | | 45 [a] | % |
| Soil/dust ingestion: | | | |
| Age (years) = | 0 - 1 | 0.085 [a] | g/day |
| | 1 - 4 | 0.135 [a] | g/day |
| | 4 - 5 | 0.100 [a] | g/day |
| | 5 - 6 | 0.090 [a] | g/day |
| | 6 - 7 | 0.085 [a] | g/day |
| **SOIL/DUST MULTIPLE SOURCE ANALYSIS** | | | |
| Fraction of indoor dust lead attributable to soil | | 0.70 [a] | unitless |
| Ratio of dust lead concentration to outdoor air lead concentration | | 100 [a] | µg Pb/g dust per µg Pb/$m^3$ air |

**Table A4-19**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Central AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | | | |
|---|---|---|---|
| **BIOAVAILABILITY FOR GUT ABSORPTION PATHWAYS** | | | |
| Total lead absorption (at low intake): | | Total Soil | |
| | diet | 50 [a] | % |
| | drinking water | 50 [a] | % |
| | soil | 30 [a] | % |
| | dust | 30 [a] | % |
| | alternate source | 0 [a] | % |
| **BIOAVAILABILITY FOR GUT ABSORPTION PATHWAYS (continued)** | | | |
| Fraction of total net absorption at low intake rate that is attributable to non-saturable (passive) processes | | 0.2 [a] | unitless |
| **ALTERNATE SOURCES OF LEAD** | | | |
| Total lead intake: | | Soil | |
| | Age (years) = 0 - 7 | 0 [a] | µg/day |
| **MATERNAL-TO-NEWBORN LEAD EXPOSURE** | | | |
| Mothers blood lead concentration at childbirth | | 0.6 [a] | µg/dL |
| **PLOTTING AND RISK ESTIMATION** | | | |
| Geometric standard deviation (GSD) for blood lead | | 1.6 [a] | unitless |
| Blood lead level (BLL) of concern | | 5 [a] | µg/dL |
| **COMPUTATION OPTIONS** | | | |
| Iteration time step for numerical integration | | 4 [a] | hours |
| **PROBABILITY DISTRIBUTION PERCENT RESULTS** | | | |
| Geometric mean | | 4.205 Calc | unitless |
| Age Range | | 12-72 [a] | months |
| Percent above allowable BLL | | 35.628 Calc | % |

**Table A4-19**
**Integrated Exposure Uptake Biokinetic (IEUBK) Model Results Using BLL of 5 µg/dL**
**Lead in Soil, Child Resident**
**Central AOC Total Soil Results**
**Human Health Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

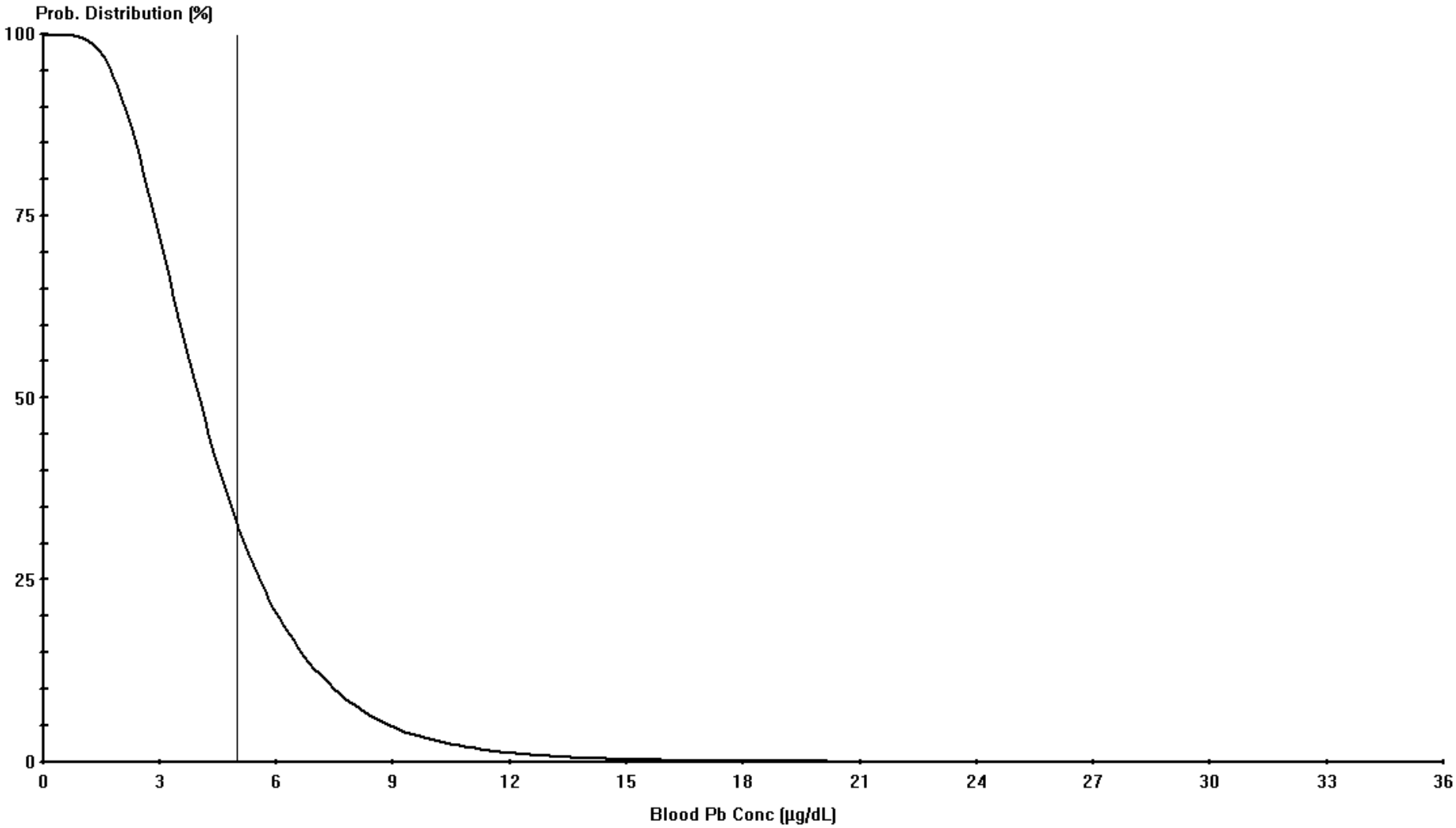
**Notes:**

[1] Young child = 0 - 7 years of age (12 - 72 months) (EPA 2021b).
[a] IEUBK model default value (EPA 2021a and 2021b).

L/day = liters per day
Pb = lead
$\mu g/m^3$ = micrograms per cubic meter
µg/dL = micrograms per deciliter
µg/g = micrograms per gram
mg/kg = milligrams per kilogram

**References:**

EPA 2021a. Integrated Exposure Uptake Biokinetic Model for Lead in Children, Windows® version (IEUBKwinv2 build 1.66) Dated May 2021.
EPA 2021b. User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows® version 2 (Updated May 2021). The Technical Review Workgroup (TRW) Lead Committee.




Cutoff = 5.000 µg/dl
Geo Mean = 4.205
GSD = 1.600
% Above = 35.628

Age Range = 12 to 72 months

Run Mode = Research
Comment = 394.6 mg/kg

These IEUBK Model results are valid as long as they were produced with an official, unmodified version of the IEUBK Model with a software certificate.
While IEUBK Model output is generally written with three digits to the right of the decimal point, the true precision of the output is strongly influenced by least precise input values.

# Attachment 5

## Human Health Cancer Risk and Non-Cancer Hazard Calculations

# Cancer and Non-Cancer Toxicity Data

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Volatile Organic Compounds (VOCs) | | | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| 1,1,2,2-Tetrachloroethane | Subchronic | 0.05 | mg/kg-day | 1 | 0.05 | mg/kg-day | OT | 300 | IRIS | 10/4/2021 |
| 1,1,2-Trichloroethane | Chronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | HM; IM | 1000 | IRIS | 10/4/2021 |
| 1,1,2-Trichloroethane | Subchronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | HP | 1000 | PPRTV Current | 10/4/2021 |
| 1,1-Dichloroethane | Chronic | 0.2 | mg/kg-day | 1 | 0.2 | mg/kg-day | UR | 3000 | PPRTV Current | 10/4/2021 |
| 1,1-Dichloroethane | Subchronic | 2 | mg/kg-day | 1 | 2 | mg/kg-day | UR | 300 | PPRTV Current | 10/4/2021 |
| 1,1-Dichloroethene | Chronic | 0.05 | mg/kg-day | 1 | 0.05 | mg/kg-day | HP | 100 | IRIS | 10/4/2021 |
| 1,1-Dichloroethene | Subchronic | 0.009 | mg/kg-day | 1 | 0.009 | mg/kg-day | HP | 1000 | HEAST | 10/4/2021 |
| 1,2,4-Trichlorobenzene | Chronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | EN | 1000 | IRIS | 10/4/2021 |
| 1,2,4-Trichlorobenzene | Subchronic | 0.09 | mg/kg-day | 1 | 0.09 | mg/kg-day | HP | 100 | PPRTV Current | 10/4/2021 |
| 1,2-Dibromo-3-chloropropane | Chronic | 0.0002 | mg/kg-day | 1 | 0.0002 | mg/kg-day | RP | 3000 | PPRTV Current | 10/4/2021 |
| 1,2-Dibromo-3-chloropropane | Subchronic | 0.002 | mg/kg-day | 1 | 0.002 | mg/kg-day | RP | 300 | PPRTV Current | 10/4/2021 |
| 1,2-Dibromoethane | Chronic | 0.009 | mg/kg-day | 1 | 0.009 | mg/kg-day | EN; HP; RP | 3000 | IRIS | 10/4/2021 |
| 1,2-Dibromoethane | Subchronic | 0.009 | mg/kg-day | 1 | 0.009 | mg/kg-day | EN; HP; RP | 3000 | IRIS | 10/4/2021 |
| 1,2-Dichloroethane | Chronic | 0.006 | mg/kg-day | 1 | 0.006 | mg/kg-day | UR | 10000 | PPRTV Screen | 10/4/2021 |
| 1,2-Dichloroethane | Subchronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | UR | 3000 | PPRTV Current | 10/4/2021 |
| 1,2-Dichloropropane | Chronic | 0.04 | mg/kg-day | 1 | 0.04 | mg/kg-day | MS | 30 | PPRTV Current | 10/4/2021 |
| 1,2-Dichloropropane | Subchronic | 0.04 | mg/kg-day | 1 | 0.04 | mg/kg-day | MS | 30 | PPRTV Current | 10/4/2021 |
| 1,4-Dichlorobenzene | Chronic | 0.07 | mg/kg-day | 1 | 0.07 | mg/kg-day | HP | 100 | ATSDR Final | 10/4/2021 |
| 1,4-Dichlorobenzene | Subchronic | 0.07 | mg/kg-day | 1 | 0.07 | mg/kg-day | HP | 100 | ATSDR Final | 10/4/2021 |
| 2-Hexanone | Chronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | NV | 1000 | IRIS | 10/4/2021 |
| 2-Hexanone | Subchronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | NV | 1000 | IRIS | 10/4/2021 |
| Benzene | Chronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | IM | 300 | IRIS | 10/4/2021 |
| Benzene | Subchronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | HM | 100 | PPRTV Current | 10/4/2021 |
| Bromodichloromethane | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | UR | 1000 | IRIS | 10/4/2021 |
| Bromodichloromethane | Subchronic | 0.008 | mg/kg-day | 1 | 0.008 | mg/kg-day | RP | 100 | PPRTV Current | 10/4/2021 |
| Bromoform | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| Bromoform | Subchronic | 0.03 | mg/kg-day | 1 | 0.03 | mg/kg-day | HP | 100 | PPRTV | 10/4/2021 |
| Bromomethane | Chronic | 0.0014 | mg/kg-day | 1 | 0.0014 | mg/kg-day | GI | 1000 | IRIS | 10/4/2021 |
| Bromomethane | Subchronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | GI | 300 | PPRTV Current | 10/4/2021 |
| Carbon Tetrachloride | Chronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | HM | 1000 | IRIS | 10/4/2021 |
| Carbon Tetrachloride | Subchronic | 0.007 | mg/kg-day | 1 | 0.007 | mg/kg-day | HP | 100 | PPRTV Archive | 10/4/2021 |
| Chlorobenzene | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| Chlorobenzene | Subchronic | 0.07 | mg/kg-day | 1 | 0.07 | mg/kg-day | HP; UR | 300 | PPRTV ARCHIVE | 10/4/2021 |
| Chloroform | Chronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | HP | 100 | IRIS | 10/4/2021 |
| Chloroform | Subchronic | 0.1 | mg/kg-day | 1 | 0.1 | mg/kg-day | HP | 100 | ATSDR Final | 10/4/2021 |
| Chloromethane | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Chloromethane | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| cis-1,2-Dichloroethene | Chronic | 0.002 | mg/kg-day | 1 | 0.002 | mg/kg-day | UR | 3000 | IRIS | 10/4/2021 |
| cis-1,2-Dichloroethene | Subchronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | UR | 300 | PPRTV Current | 10/4/2021 |
| cis-1,3-Dichloropropene | Chronic | 0.03 | mg/kg-day | 1 | 0.03 | mg/kg-day | GI | 100 | IRIS | 10/4/2021 |
| cis-1,3-Dichloropropene | Subchronic | 0.04 | mg/kg-day | 1 | 0.04 | mg/kg-day | GI | 100 | ATSDR Final | 10/4/2021 |
| Cyclohexane | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Cyclohexane | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibromochloromethane | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| Dibromochloromethane | Subchronic | 0.07 | mg/kg-day | 1 | 0.07 | mg/kg-day | HP | 300 | PPRTV Current | 10/4/2021 |
| Dichlorodifluoromethane | Chronic | 0.2 | mg/kg-day | 1 | 0.2 | mg/kg-day | OT | 100 | IRIS | 10/4/2021 |
| Dichlorodifluoromethane | Subchronic | 0.05 | mg/kg-day | 1 | 0.05 | mg/kg-day | OT | 300 | PPRTV Current | 10/4/2021 |
| Ethylbenzene | Chronic | 0.1 | mg/kg-day | 1 | 0.1 | mg/kg-day | HP; UR | 1000 | IRIS | 10/4/2021 |
| Ethylbenzene | Subchronic | 0.05 | mg/kg-day | 1 | 0.05 | mg/kg-day | HP | 1000 | PPRTV Current | 10/4/2021 |
| Hexachlorobutadiene | Chronic | 0.001 | mg/kg-day | 1 | 0.001 | mg/kg-day | UR | 100 | PPRTV Current | 10/4/2021 |
| Hexachlorobutadiene | Subchronic | 0.001 | mg/kg-day | 1 | 0.001 | mg/kg-day | UR | 100 | PPRTV Current | 10/4/2021 |
| Isopropylbenzene | Chronic | 0.1 | mg/kg-day | 1 | 0.1 | mg/kg-day | UR | 1000 | IRIS | 10/4/2021 |
| Isopropylbenzene | Subchronic | 0.4 | mg/kg-day | 1 | 0.4 | mg/kg-day | UR | 300 | HEAST | 10/4/2021 |
| Methyl Tertiary Butyl Ether | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Methyl Tertiary Butyl Ether | Subchronic | 0.3 | mg/kg-day | 1 | 0.3 | mg/kg-day | HP | 300 | ATSDR | 10/4/2021 |
| Methylene Chloride | Chronic | 0.006 | mg/kg-day | 1 | 0.006 | mg/kg-day | HP | 30 | IRIS | 10/4/2021 |
| Methylene Chloride | Subchronic | 0.06 | mg/kg-day | 1 | 0.06 | mg/kg-day | HP | 100 | HEAST Current | 10/4/2021 |
| Naphthalene | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | OT | 3000 | IRIS | 10/4/2021 |
| Naphthalene | Subchronic | 0.6 | mg/kg-day | 1 | 0.6 | mg/kg-day | NV | 90 | ATSDR Final | 10/4/2021 |
| Tetrachloroethene | Chronic | 0.006 | mg/kg-day | 1 | 0.006 | mg/kg-day | NV | 1000 | IRIS | 10/4/2021 |
| Tetrachloroethene | Subchronic | 0.008 | mg/kg-day | 1 | 0.008 | mg/kg-day | NV | 100 | ATSDR | 10/4/2021 |
| Toluene | Chronic | 0.08 | mg/kg-day | 1 | 0.08 | mg/kg-day | UR | 3000 | IRIS | 10/4/2021 |
| Toluene | Subchronic | 0.8 | mg/kg-day | 1 | 0.8 | mg/kg-day | UR | 300 | PPRTV Current | 10/4/2021 |
| trans-1,2-Dichloroethene | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | IM | 3000 | IRIS | 10/4/2021 |
| trans-1,2-Dichloroethene | Subchronic | 0.2 | mg/kg-day | 1 | 0.2 | mg/kg-day | HP | 100 | ATSDR Final | 10/4/2021 |
| trans-1,3-Dichloropropene | Chronic | 0.03 | mg/kg-day | 1 | 0.03 | mg/kg-day | GI | 100 | IRIS | 10/4/2021 |
| trans-1,3-Dichloropropene | Subchronic | 0.04 | mg/kg-day | 1 | 0.04 | mg/kg-day | GI | 100 | ATSDR Final | 10/4/2021 |
| Trichloroethene | Chronic | 0.0005 | mg/kg-day | 1 | 0.0005 | mg/kg-day | DV; IM | 1 | IRIS | 10/4/2021 |
| Trichloroethene | Subchronic | 0.0005 | mg/kg-day | 1 | 0.0005 | mg/kg-day | DV; IM | N/A | ATSDR Final | 10/4/2021 |
| Vinyl Chloride | Chronic | 0.003 | mg/kg-day | 1 | 0.003 | mg/kg-day | HP | 30 | IRIS | 10/4/2021 |
| Vinyl Chloride | Subchronic | 0.003 | mg/kg-day | 1 | 0.003 | mg/kg-day | HP | 30 | IRIS | 10/4/2021 |
| Xylenes, Total | Chronic | 0.2 | mg/kg-day | 1 | 0.2 | mg/kg-day | OT | 1000 | IRIS | 10/4/2021 |
| Xylenes, Total | Subchronic | 0.4 | mg/kg-day | 1 | 0.4 | mg/kg-day | OT | 1000 | PPRTV Current | 10/4/2021 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | |

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| 1,1'-Biphenyl | Chronic | 0.5 | mg/kg-day | 1 | 0.5 | mg/kg-day | UR | 30 | IRIS | 10/4/2021 |
| 1,1'-Biphenyl | Subchronic | 0.1 | mg/kg-day | 1 | 0.1 | mg/kg-day | DV | 100 | PPRTV Current | 10/4/2021 |
| 1,2-Dichlorobenzene | Chronic | 0.09 | mg/kg-day | 1 | 0.09 | mg/kg-day | OT | 1000 | IRIS | 10/4/2021 |
| 1,2-Dichlorobenzene | Subchronic | 0.6 | mg/kg-day | 1 | 0.6 | mg/kg-day | HP | 100 | ATSDR Final | 10/4/2021 |
| 1,3-Dichlorobenzene | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| 1,3-Dichlorobenzene | Subchronic | 0.07 | mg/kg-day | 1 | 0.07 | mg/kg-day | HP; UR | 300 | PPRTV Current | 10/4/2021 |
| 2,4,6-Trichlorophenol | Chronic | 0.001 | mg/kg-day | 1 | 0.001 | mg/kg-day | RP | 3000 | PPRTV Current | 10/4/2021 |
| 2,4,6-Trichlorophenol | Subchronic | 0.001 | mg/kg-day | 1 | 0.001 | mg/kg-day | RP | 3000 | PPRTV Current | 10/4/2021 |
| 2,4-Dinitrophenol | Chronic | 0.002 | mg/kg-day | 1 | 0.002 | mg/kg-day | OC | 1000 | IRIS | 10/4/2021 |
| 2,4-Dinitrophenol | Subchronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | OC | 100 | PPRTV Current | 10/4/2021 |
| 2,4-Dinitrotoluene | Chronic | 0.002 | mg/kg-day | 1 | 0.002 | mg/kg-day | HM; HP; NV | 100 | IRIS | 10/4/2021 |
| 2,4-Dinitrotoluene | Subchronic | 0.007 | mg/kg-day | 1 | 0.007 | mg/kg-day | HM | 100 | ATSDR Final | 10/4/2021 |
| 2,6-Dinitrotoluene | Chronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | IM | 1000 | PPRTV Screen | 10/4/2021 |
| 2,6-Dinitrotoluene | Subchronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | OT | 300 | PPRTV Archive | 10/4/2021 |
| 2-Methylnaphthalene | Chronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | RS | 1000 | IRIS | 10/4/2021 |
| 2-Methylnaphthalene | Subchronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | RS | 1000 | PPRTV Current | 10/4/2021 |
| 2-Nitrophenol | Chronic | 0.0001 | mg/kg-day | 1 | 0.0001 | mg/kg-day | OC | 10000 | PPRTV Screen | 10/4/2021 |
| 2-Nitrophenol | Subchronic | 0.0001 | mg/kg-day | 1 | 0.0001 | mg/kg-day | OC | 10000 | PPRTV Screen | 10/4/2021 |
| 3,3-Dichlorobenzidine | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 3,3-Dichlorobenzidine | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,6-Dinitro-2-methylphenol | Chronic | 0.00008 | mg/kg-day | 1 | 0.00008 | mg/kg-day | EN; OC | 10000 | PPRTV Screen | 10/4/2021 |
| 4,6-Dinitro-2-methylphenol | Subchronic | 0.0008 | mg/kg-day | 1 | 0.0008 | mg/kg-day | EN; OC | 1000 | PPRTV Current | 10/4/2021 |
| 4-Chloroaniline | Chronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | IM | 3000 | IRIS | 10/4/2021 |
| 4-Chloroaniline | Subchronic | 0.0005 | mg/kg-day | 1 | 0.0005 | mg/kg-day | HM | 3000 | PPRTV Current | 10/4/2021 |
| 4-Nitroaniline | Chronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | IM | 100 | PPRTV Current | 10/4/2021 |
| 4-Nitroaniline | Subchronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | IM | 100 | PPRTV Current | 10/4/2021 |
| 4-Nitrophenol | Chronic | 0.0001 | mg/kg-day | 1 | 0.0001 | mg/kg-day | OC | 10000 | PPRTV Screen | 10/4/2021 |
| 4-Nitrophenol | Subchronic | 0.0001 | mg/kg-day | 1 | 0.0001 | mg/kg-day | OC | 10000 | PPRTV Screen | 10/4/2021 |
| Atrazine | Chronic | 0.035 | mg/kg-day | 1 | 0.035 | mg/kg-day | OT | 100 | IRIS | 10/4/2021 |
| Atrazine | Subchronic | 0.003 | mg/kg-day | 1 | 0.003 | mg/kg-day | RP | 300 | ATSDR | 10/4/2021 |
| Benzo(a)anthracene | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(a)anthracene | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(a)pyrene | Chronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | DV | 300 | IRIS | 10/4/2021 |
| Benzo(a)pyrene | Subchronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | DV | 300 | IRIS | 10/4/2021 |
| Benzo(b)fluoranthene | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(b)fluoranthene | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(k)fluoranthene | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(k)fluoranthene | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Bis(2-chloroethyl)ether | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Bis(2-chloroethyl)ether | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| bis(2-Ethylhexyl)phthalate | Chronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| bis(2-Ethylhexyl)phthalate | Subchronic | 0.1 | mg/kg-day | 1 | 0.1 | mg/kg-day | RP | 100 | ATSDR | 10/4/2021 |
| Butylbenzylphthalate | Chronic | 0.2 | mg/kg-day | 1 | 0.2 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| Butylbenzylphthalate | Subchronic | 2 | mg/kg-day | 1 | 2 | mg/kg-day | HP | 100 | HEAST | 10/4/2021 |
| Chrysene | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Chrysene | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenz(a,h)anthracene | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenz(a,h)anthracene | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenzofuran | Chronic | 0.001 | mg/kg-day | 1 | 0.001 | mg/kg-day | OT | 10000 | PPRTV Screen | 10/4/2021 |
| Dibenzofuran | Subchronic | 0.004 | mg/kg-day | 1 | 0.004 | mg/kg-day | OT | 3000 | PPRTV Current | 10/4/2021 |
| Hexachlorobenzene | Chronic | 0.0008 | mg/kg-day | 1 | 0.0008 | mg/kg-day | HP | 100 | IRIS | 10/4/2021 |
| Hexachlorobenzene | Subchronic | 0.00001 | mg/kg-day | 1 | 0.00001 | mg/kg-day | RP | 300 | PPRTV Current | 10/4/2021 |
| Hexachlorocyclopentadiene | Chronic | 0.006 | mg/kg-day | 1 | 0.006 | mg/kg-day | GI | 1000 | IRIS | 10/4/2021 |
| Hexachlorocyclopentadiene | Subchronic | 0.1 | mg/kg-day | 1 | 0.1 | mg/kg-day | UR | 100 | ATSDR Final | 10/4/2021 |
| Hexachloroethane | Chronic | 0.0007 | mg/kg-day | 1 | 0.0007 | mg/kg-day | UR | 1000 | IRIS | 10/4/2021 |
| Hexachloroethane | Subchronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | HP | 100 | ATSDR Final | 10/4/2021 |
| Indeno(1,2,3-cd)pyrene | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Indeno(1,2,3-cd)pyrene | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| n-Nitrosodi-n-propylamine | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| n-Nitrosodi-n-propylamine | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Nitrobenzene | Chronic | 0.002 | mg/kg-day | 1 | 0.002 | mg/kg-day | HM | 1000 | IRIS | 10/4/2021 |
| Nitrobenzene | Subchronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | EN; HM; HP; UR | 1000 | HEAST | 10/4/2021 |
| Pentachlorophenol | Chronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | HP | 300 | IRIS | 10/4/2021 |
| Pentachlorophenol | Subchronic | 0.001 | mg/kg-day | 1 | 0.001 | mg/kg-day | RP | 1000 | ATSDR Final | 10/4/2021 |
| 4,4'-DDD | Chronic | 0.00003 | mg/kg-day | 1 | 0.00003 | mg/kg-day | HP | 300 | SCREEN Current | 10/4/2021 |
| 4,4'-DDD | Subchronic | 0.00003 | mg/kg-day | 1 | 0.00003 | mg/kg-day | HP | 300 | SCREEN Current | 10/4/2021 |
| 4,4'-DDE | Chronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | HP | 3000 | SCREEN Current | 10/4/2021 |
| 4,4'-DDE | Subchronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | HP | 3000 | PPRTV Current | 10/4/2021 |
| 4,4'-DDT | Chronic | 0.0005 | mg/kg-day | 1 | 0.0005 | mg/kg-day | HP | 100 | IRIS | 10/4/2021 |
| 4,4'-DDT | Subchronic | 0.0002 | mg/kg-day | 1 | 0.0002 | mg/kg-day | HP | 1000 | ATSDR | |
| Aldrin | Chronic | 0.00003 | mg/kg-day | 1 | 0.00003 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| Aldrin | Subchronic | 0.00004 | mg/kg-day | 1 | 0.00004 | mg/kg-day | UR | 1000 | PPRTV | 10/4/2021 |
| alpha-BHC | Chronic | 0.008 | mg/kg-day | 1 | 0.008 | mg/kg-day | HP | 100 | ATSDR | 10/4/2021 |
| alpha-BHC | Subchronic | -- | mg/kg-day | 1 | -- | mg/kg-day | -- | -- | -- | 10/4/2021 |
| Dieldrin | Chronic | 0.00005 | mg/kg-day | 1 | 0.00005 | mg/kg-day | HP | 100 | IRIS | 10/4/2021 |
| Dieldrin | Subchronic | 0.0001 | mg/kg-day | 1 | 0.0001 | mg/kg-day | NV | 100 | ATSDR | 10/4/2021 |

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Heptachlor | Chronic | 0.0005 | mg/kg-day | 1 | 0.0005 | mg/kg-day | HP | 300 | IRIS | 10/4/2021 |
| Heptachlor | Subchronic | 0.0001 | mg/kg-day | 1 | 0.0001 | mg/kg-day | IM | 300 | ATSDR | 10/4/2021 |
| Heptachlor epoxide | Chronic | 0.000013 | mg/kg-day | 1 | 0.000013 | mg/kg-day | HP | 1000 | IRIS | 10/4/2021 |
| Heptachlor epoxide | Subchronic | 0.000013 | mg/kg-day | 1 | 0.000013 | mg/kg-day | HP | 1000 | HEAST | 10/4/2021 |
| Toxaphene | Chronic | 0.00009 | mg/kg-day | 1 | 0.00009 | mg/kg-day | HP | 100 | PPRTV | 10/4/2021 |
| Toxaphene | Subchronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | HP | 30 | PPRTV | 10/4/2021 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | | | |
| Aroclor 1221 | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1221 | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1232 | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1232 | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1242 | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1242 | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1248 | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1248 | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1254 | Chronic | 0.00002 | mg/kg-day | 1 | 0.00002 | mg/kg-day | OT | 300 | IRIS | 10/4/2021 |
| Aroclor 1254 | Subchronic | 0.00003 | mg/kg-day | 1 | 0.00003 | mg/kg-day | NV | 300 | ATSDR | 10/4/2021 |
| Aroclor 1260 | Chronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1260 | Subchronic | -- | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Dioxins/Furans | | | | | | | | | | |
| 2,3,7,8-TCDD TEQ | Chronic | 7E-10 | mg/kg-day | 1 | 7.00E-10 | mg/kg-day | RP | 30 | IRIS | 10/4/2021 |
| 2,3,7,8-TCDD TEQ | Subchronic | 0.00000002 | mg/kg-day | 1 | 2.00E-08 | mg/kg-day | IM | 30 | ATSDR Final | 10/4/2021 |
| Cyanide | | | | | | | | | | |
| Cyanide | Chronic | 0.0006 | mg/kg-day | 1 | 0.0006 | mg/kg-day | RP | 3000 | IRIS | 10/4/2021 |
| Cyanide | Subchronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | OT | 500 | HEAST | 10/4/2021 |
| Metals | | | | | | | | | | |
| Aluminum | Chronic | 1 | mg/kg-day | 1 | 1 | mg/kg-day | NV | 100 | PPRTV Current | 10/4/2021 |
| Aluminum | Subchronic | 1 | mg/kg-day | 1 | 1 | mg/kg-day | NV | 100 | ATSDR Final | 10/4/2021 |
| Antimony | Chronic | 0.0004 | mg/kg-day | 0.15 | 0.00006 | mg/kg-day | HM; OT | 1000 | IRIS | 10/4/2021 |
| Antimony | Subchronic | 0.0004 | mg/kg-day | 0.15 | 0.00006 | mg/kg-day | OT | 1000 | PPRTV Current | 10/4/2021 |
| Arsenic | Chronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | CV; DM | 3 | IRIS | 10/4/2021 |
| Arsenic | Subchronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | DM | 10 | PPRTV Archive | 10/4/2021 |
| Barium | Chronic | 0.2 | mg/kg-day | 0.07 | 0.014 | mg/kg-day | NV | 300 | IRIS | 10/4/2021 |
| Barium | Subchronic | 0.2 | mg/kg-day | 0.07 | 0.014 | mg/kg-day | UR | 100 | ATSDR Final | 10/4/2021 |
| Beryllium | Chronic | 0.002 | mg/kg-day | 0.007 | 0.000014 | mg/kg-day | GI | 300 | IRIS | 10/4/2021 |
| Beryllium | Subchronic | 0.005 | mg/kg-day | 0.007 | 0.000035 | mg/kg-day | -- | 100 | HEAST | 10/4/2021 |
| Cadmium (Diet) | Chronic | 0.001 | mg/kg-day | 0.025 | 0.000025 | mg/kg-day | UR | 10 | IRIS | 10/4/2021 |
| Cadmium (Diet) | Subchronic | 0.0005 | mg/kg-day | 0.025 | 0.0000125 | mg/kg-day | MS | 100 | ATSDR Final | 10/4/2021 |

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Cadmium (Water) | Chronic | 0.0005 | mg/kg-day | 0.05 | 0.000025 | mg/kg-day | UR | 10 | IRIS | 10/4/2021 |
| Cadmium (Water) | Subchronic | 0.0005 | mg/kg-day | 0.05 | 0.000025 | mg/kg-day | MS | 100 | ATSDR | 10/4/2021 |
| Chromium, Total | Chronic | 0.003 | mg/kg-day | 0.025 | 0.000075 | mg/kg-day | NA | 900 | IRIS | 10/4/2021 |
| Chromium, Total | Subchronic | 0.005 | mg/kg-day | 0.025 | 0.000125 | mg/kg-day | HM | 100 | ATSDR Final | 10/4/2021 |
| Cobalt | Chronic | 0.0003 | mg/kg-day | 1 | 0.0003 | mg/kg-day | EN | 3000 | PPRTV Current | 10/4/2021 |
| Cobalt | Subchronic | 0.003 | mg/kg-day | 1 | 0.003 | mg/kg-day | EN | 300 | PPRTV Current | 10/4/2021 |
| Copper | Chronic | 0.0325 | mg/kg-day | 1 | 0.0325 | mg/kg-day | GI | N/A | HEAST Current | 10/4/2021 |
| Copper | Subchronic | 0.01 | mg/kg-day | 1 | 0.01 | mg/kg-day | GI | 3 | ATSDR Final | 10/4/2021 |
| Cyanide | Chronic | 0.0006 | mg/kg-day | 1 | 0.0006 | mg/kg-day | RP | 3000 | IRIS | 10/4/2021 |
| Cyanide | Subchronic | 0.02 | mg/kg-day | 1 | 0.02 | mg/kg-day | OT; EN; NV | 500 | HEAST Current | 10/4/2021 |
| Iron | Chronic | 0.7 | mg/kg-day | 1 | 0.7 | mg/kg-day | GI | 1.5 | PPRTV Current | 10/4/2021 |
| Iron | Subchronic | 0.7 | mg/kg-day | 1 | 0.7 | mg/kg-day | GI | 1.5 | PPRTV Current | 10/4/2021 |
| Manganese | Chronic | 0.024 | mg/kg-day | 0.04 | 0.00096 | mg/kg-day | NV | 3 | IRIS | 10/4/2021 |
| Manganese | Subchronic | 0.024 | mg/kg-day | 0.04 | 0.00096 | mg/kg-day | NV | 3 | IRIS | 10/4/2021 |
| Mercury | Chronic | 0.00016 | mg/kg-day | 0.07 | 0.0000112 | mg/kg-day | -- | N/A | CALEPA | 10/4/2021 |
| Mercury | Subchronic | -- | mg/kg-day | 0.07 | -- | mg/kg-day | -- | -- | -- | 10/4/2021 |
| Nickel | Chronic | 0.02 | mg/kg-day | 0.04 | 0.0008 | mg/kg-day | OT | 300 | IRIS | 10/4/2021 |
| Nickel | Subchronic | 0.02 | mg/kg-day | 0.04 | 0.0008 | mg/kg-day | OT | 300 | HEAST | 10/4/2021 |
| Selenium | Chronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | OT | 3 | IRIS | 10/4/2021 |
| Selenium | Subchronic | 0.005 | mg/kg-day | 1 | 0.005 | mg/kg-day | OT | 3 | HEAST | 10/4/2021 |
| Silver | Chronic | 0.005 | mg/kg-day | 0.04 | 0.0002 | mg/kg-day | DM | 3 | IRIS | 10/4/2021 |
| Silver | Subchronic | 0.005 | mg/kg-day | 0.04 | 0.0002 | mg/kg-day | DM | 3 | HEAST | 10/4/2021 |
| Thallium | Chronic | 0.00001 | mg/kg-day | 1 | 0.00001 | mg/kg-day | DM | 3000 | PPRTV Screen | 10/4/2021 |
| Thallium | Subchronic | 0.00004 | mg/kg-day | 1 | 0.00004 | mg/kg-day | DM | 1000 | PPRTV Screen | 10/4/2021 |
| Vanadium | Chronic | 0.00504 | mg/kg-day | 0.026 | 0.00013104 | mg/kg-day | DM | 100 | IRIS | 10/4/2021 |
| Vanadium | Subchronic | 0.01 | mg/kg-day | 0.026 | 0.00026 | mg/kg-day | HM | 10 | ATSDR Final | 10/4/2021 |
| Zinc | Chronic | 0.3 | mg/kg-day | 1 | 0.3 | mg/kg-day | HM | 3 | IRIS | 10/4/2021 |
| Zinc | Subchronic | 0.3 | mg/kg-day | 1 | 0.3 | mg/kg-day | HM | 3 | ATSDR Final | 10/4/2021 |

Notes:

-- = No Value; mg/kg-day = milligrams per kilogram -day; RfD = Reference Dose

(1) Source: U.S. Environmental Protection Agency (EPA) July 2004. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Office of Emergency and Remedial Response. Washington D.C. EPA/540/R/99/005.

(2) To derive the Absorbed RfD for Dermal, the oral RfD is multiplied by the oral absorption efficiency.

(3) if no subchronic toxicity value is available, then the chronic value is used in the calculations.

RfD: Target Organ Source Information:

ATSDR = Agency for Toxic Substance & Disease Registry (https://www.atsdr.cdc.gov)

HEAST = Health Effects Assessment Summary Table (https://www.epa-heast.ornl.gov/)

IRIS = Integrated Risk Information System (https://www.epa.gov/iris)

PPRTV = Provisional Peer-Reviewed Toxicity Values (https://www.hhpprtv.ornl.gov/)

Target Organ Codes:

CV = Cardiovascular HM = Hematological OC = Ocular
DM = Dermal HP = Hepatic OT = Other

Table 5-1
Non-Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic [3] | Oral RfD | | Oral Absorption Effiency for Dermal [1] | Absorbed RfD for Dermal [2] | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfD: Target Organ(s) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| | | | | | | | DV = Developmental<br>EN = Endocrine<br>GI = Gastrointestinal | IM = Immune<br>MS = Musculoskeletal<br>NV = Nervous | RP = Reproductive<br>UR = Urinary | |

Table 5-2
Non-Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Volatile Organic Compounds (VOCs) | | | | | | | |
| 1,1,2,2-Tetrachloroethane | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 1,1,2,2-Tetrachloroethane | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 1,1,2-Trichloroethane | Chronic | 0.0002 | mg/m³ | RS | 3000 | PPRTV Screen | 10/4/2021 |
| 1,1,2-Trichloroethane | Subchronic | 0.002 | mg/m³ | RS | 300 | PPRTV Screen | 10/4/2021 |
| 1,1-Dichloroethane | Chronic | 0.5 | mg/m³ | UR | 1000 | HEAST Archive | 10/4/2021 |
| 1,1-Dichloroethane | Subchronic | 5 | mg/m³ | UR | 100 | HEAST Archive | 10/4/2021 |
| 1,1-Dichloroethene | Chronic | 0.2 | mg/m³ | HP | 30 | IRIS | 10/4/2021 |
| 1,1-Dichloroethene | Subchronic | 0.004 | mg/m³ | RS | 30 | ATSDR Draft | 10/4/2021 |
| 1,2,4-Trichlorobenzene | Chronic | 0.002 | mg/m³ | UR | 3000 | PPRTV Current | 10/4/2021 |
| 1,2,4-Trichlorobenzene | Subchronic | 0.02 | mg/m³ | UR | 300 | PPRTV Current | 10/4/2021 |
| 1,2-Dibromo-3-chloropropane | Chronic | 0.0002 | mg/m³ | RP | 1000 | IRIS | 10/4/2021 |
| 1,2-Dibromo-3-chloropropane | Subchronic | 0.002 | mg/m³ | RP | 100 | PPRTV Current | 10/4/2021 |
| 1,2-Dibromoethane | Chronic | 0.009 | mg/m³ | RS | 300 | IRIS | 10/4/2021 |
| 1,2-Dibromoethane | Subchronic | 0.002 | mg/m³ | RP | 100 | HEAST | 10/4/2021 |
| 1,2-Dichloroethane | Chronic | 0.007 | mg/m³ | NV | 3000 | PPRTV Current | 10/4/2021 |
| 1,2-Dichloroethane | Subchronic | 0.07 | mg/m³ | NV | 300 | PPRTV Current | 10/4/2021 |
| 1,2-Dichloropropane | Chronic | 0.004 | mg/m³ | RS | 300 | IRIS | 10/4/2021 |
| 1,2-Dichloropropane | Subchronic | 0.00924 | mg/m³ | RS | 30 | ATSDR Draft | 10/4/2021 |
| 1,4-Dichlorobenzene | Chronic | 0.8 | mg/m³ | HP | 100 | IRIS | 10/4/2021 |
| 1,4-Dichlorobenzene | Subchronic | 1.202453988 | mg/m³ | HP | 100 | ATSDR Final | 10/4/2021 |
| 2-Hexanone | Chronic | 0.03 | mg/m³ | NV | 3000 | IRIS | 10/4/2021 |
| 2-Hexanone | Subchronic | 0.03 | mg/m³ | NV | 3000 | IRIS | 10/4/2021 |
| Benzene | Chronic | 0.03 | mg/m³ | IM | 300 | IRIS | 10/4/2021 |
| Benzene | Subchronic | 0.08 | mg/m³ | HM | 100 | PPRTV CURRENT | 10/4/2021 |
| Bromodichloromethane | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Bromodichloromethane | Subchronic | 0.02 | mg/m³ | UR | 300 | PPRTV Current | 10/4/2021 |
| Bromoform | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Bromoform | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Bromomethane | Chronic | 0.005 | mg/m³ | NV; RS | 100 | IRIS | 10/4/2021 |
| Bromomethane | Subchronic | 0.1 | mg/m³ | RS | 30 | PPRTV Current | 10/4/2021 |
| Carbon Tetrachloride | Chronic | 0.1 | mg/m³ | HP | 100 | IRIS | 10/4/2021 |
| Carbon Tetrachloride | Subchronic | 0.188736196 | mg/m³ | HP | 300 | ATSDR Final | 10/4/2021 |
| Chlorobenzene | Chronic | 0.05 | mg/m³ | HP; UR | 1000 | PPRTV CURRENT | 10/4/2021 |
| Chlorobenzene | Subchronic | 0.5 | mg/m³ | HP; UR | 100 | PPRTV CURRENT | 10/4/2021 |
| Chloroform | Chronic | 0.097652352 | mg/m³ | HP | 100 | ATSDR Final | 10/4/2021 |
| Chloroform | Subchronic | 0.244130879 | mg/m³ | HP | 100 | ATSDR Final | 10/4/2021 |
| Chloromethane | Chronic | 0.09 | mg/m³ | NV | 1000 | IRIS | 10/4/2021 |

Table 5-2
Non-Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Chloromethane | Subchronic | 3 | mg/m³ | NV | 30 | PPRTV | 10/4/2021 |
| cis-1,2-Dichloroethene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| cis-1,2-Dichloroethene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| cis-1,3-Dichloropropene | Chronic | 0.02 | mg/m³ | RS | 30 | IRIS | 10/4/2021 |
| cis-1,3-Dichloropropene | Subchronic | 0.036309202 | mg/m³ | RS | 30 | ATSDR Final | 10/4/2021 |
| Cyclohexane | Chronic | 6 | mg/m³ | DV | 300 | IRIS | 10/4/2021 |
| Cyclohexane | Subchronic | 18 | mg/m³ | DV | 100 | PPRTV | 10/4/2021 |
| Dibromochloromethane | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibromochloromethane | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dichlorodifluoromethane | Chronic | 0.1 | mg/m³ | OT | 10000 | PPRTV Screen | 10/4/2021 |
| Dichlorodifluoromethane | Subchronic | 1 | mg/m³ | OT | 1000 | PPRTV Current | 10/4/2021 |
| Ethylbenzene | Chronic | 1 | mg/m³ | DV | 300 | IRIS | 10/4/2021 |
| Ethylbenzene | Subchronic | 9 | mg/m³ | OT | 100 | PPRTV CURRENT | 10/4/2021 |
| Hexachlorobutadiene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Hexachlorobutadiene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Isopropylbenzene | Chronic | 0.4 | mg/m³ | EN | 1000 | IRIS | 10/4/2021 |
| Isopropylbenzene | Subchronic | 0.09 | mg/m³ | NV; RS | 1000 | HEAST | 10/4/2021 |
| Methyl Tertiary Butyl Ether | Chronic | 3 | mg/m³ | HP; UR | 100 | IRIS | 10/4/2021 |
| Methyl Tertiary Butyl Ether | Subchronic | 2.523721881 | mg/m³ | NV | 100 | ATSDR Final | 10/4/2021 |
| Methylene Chloride | Chronic | 0.6 | mg/m³ | HP | 30 | IRIS | 10/4/2021 |
| Methylene Chloride | Subchronic | 1.0420859 | mg/m³ | HP | 90 | ATSDR Final | 10/4/2021 |
| Naphthalene | Chronic | 0.003 | mg/m³ | NV; RS | 3000 | IRIS | 10/4/2021 |
| Naphthalene | Subchronic | 0.003 | mg/m³ | NV; RS | 3000 | IRIS | 10/4/2021 |
| Tetrachloroethene | Chronic | 0.04 | mg/m³ | NV | 1000 | IRIS | 10/4/2021 |
| Tetrachloroethene | Subchronic | 0.04 | mg/m³ | NV | 100 | ATSDR | 10/4/2021 |
| Toluene | Chronic | 5 | mg/m³ | NV | 10 | IRIS | 10/4/2021 |
| Toluene | Subchronic | 5 | mg/m³ | NV | 10 | PPRTV CURRENT | 10/4/2021 |
| trans-1,2-Dichloroethene | Chronic | 0.04 | mg/m³ | HP; RS | 3000 | SCREEN Current | 10/4/2021 |
| trans-1,2-Dichloroethene | Subchronic | 0.4 | mg/m³ | HP | 1000 | SCREEN Current | 10/4/2021 |
| trans-1,3-Dichloropropene | Chronic | 0.02 | mg/m³ | RS | 30 | IRIS | 10/4/2021 |
| trans-1,3-Dichloropropene | Subchronic | 0.036309202 | mg/m³ | RS | 30 | ATSDR Final | 10/4/2021 |
| Trichloroethene | Chronic | 0.002 | mg/m³ | DV; IM | 1 | IRIS | 10/4/2021 |
| Trichloroethene | Subchronic | 0.002 | mg/m³ | DV; IM | N/A | ATSDR Final | 10/4/2021 |
| Vinyl Chloride | Chronic | 0.1 | mg/m³ | HP | 30 | IRIS | 10/4/2021 |
| Vinyl Chloride | Subchronic | 0.08 | mg/m³ | HP | 30 | ATSDR Final | 10/4/2021 |
| Xylenes, Total | Chronic | 0.1 | mg/m³ | NV | 300 | IRIS | 10/4/2021 |
| Xylenes, Total | Subchronic | 0.4 | mg/m³ | OT | 100 | PPRTV CURRENT | 10/4/2021 |
| Semi-volatile Organic Compounds (SVOCs) | | | | | | | |

Table 5-2
Non-Cancer Toxicity Data - Inhalation
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Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| 1,1'-Biphenyl | Chronic | 0.0004 | mg/m³ | HP; UR | 3000 | SCREEN CURRENT | 10/4/2021 |
| 1,1'-Biphenyl | Subchronic | 0.004 | mg/m³ | HP; UR | 300 | SCREEN CURRENT | 10/4/2021 |
| 1,2-Dichlorobenzene | Chronic | 0.2 | mg/m³ | OT | 1000 | HEAST CURRENT | 10/4/2021 |
| 1,2-Dichlorobenzene | Subchronic | 2 | mg/m³ | OT | 100 | HEAST CURRENT | 10/4/2021 |
| 1,3-Dichlorobenzene | Chronic | 0.2 | mg/m³ | OT | 1000 | HEAST | 10/4/2021 |
| 1,3-Dichlorobenzene | Subchronic | 2 | mg/m³ | OT | 100 | HEAST | 10/4/2021 |
| 2,4,6-Trichlorophenol | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4,6-Trichlorophenol | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4-Dinitrophenol | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4-Dinitrophenol | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4-Dinitrotoluene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4-Dinitrotoluene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,6-Dinitrotoluene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,6-Dinitrotoluene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2-Methylnaphthalene | Chronic | 0.003 | mg/m³ | NV; RS | 3000 | IRIS | 10/4/2021 |
| 2-Methylnaphthalene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2-Nitrophenol | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 2-Nitrophenol | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 3,3-Dichlorobenzidine | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 3,3-Dichlorobenzidine | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,6-Dinitro-2-methylphenol | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,6-Dinitro-2-methylphenol | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4-Chloroaniline | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4-Chloroaniline | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4-Nitroaniline | Chronic | 0.006 | mg/m³ | HM | 300 | PPRTV Current | 10/4/2021 |
| 4-Nitroaniline | Subchronic | 0.02 | mg/m³ | HM | 100 | PPRTV Current | 10/4/2021 |
| 4-Nitrophenol | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4-Nitrophenol | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Atrazine | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Atrazine | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(a)anthracene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(a)anthracene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(a)pyrene | Chronic | 0.000002 | mg/m³ | DV | 3000 | IRIS | 10/4/2021 |
| Benzo(a)pyrene | Subchronic | 0.000002 | mg/m³ | DV | 3000 | IRIS | 10/4/2021 |
| Benzo(b)fluoranthene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(b)fluoranthene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(k)fluoranthene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzo(k)fluoranthene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |

Table 5-2
Non-Cancer Toxicity Data - Inhalation
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Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Bis(2-chloroethyl)ether | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Bis(2-chloroethyl)ether | Subchronic | 0.116981595 | mg/m³ | OT | 1000 | ATSDR Final | 10/4/2021 |
| bis(2-Ethylhexyl)phthalate | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| bis(2-Ethylhexyl)phthalate | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Butylbenzylphthalate | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Butylbenzylphthalate | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Chrysene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Chrysene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenz(a,h)anthracene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenz(a,h)anthracene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenzofuran | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibenzofuran | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Hexachlorobenzene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Hexachlorobenzene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Hexachlorocyclopentadiene | Chronic | 0.0002 | mg/m³ | RS | 100 | IRIS | 10/4/2021 |
| Hexachlorocyclopentadiene | Subchronic | 0.111562372 | mg/m³ | RS | 30 | ATSDR Final | 10/4/2021 |
| Hexachloroethane | Chronic | 0.03 | mg/m³ | NV | 3000 | IRIS | 10/4/2021 |
| Hexachloroethane | Subchronic | 58.09570552 | mg/m³ | NV | 30 | ATSDR Final | 10/4/2021 |
| Indeno(1,2,3-cd)pyrene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Indeno(1,2,3-cd)pyrene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| n-Nitrosodi-n-propylamine | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| n-Nitrosodi-n-propylamine | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Nitrobenzene | Chronic | 0.009 | mg/m³ | NV; RS | 30 | IRIS | 10/4/2021 |
| Nitrobenzene | Subchronic | 0.02 | mg/m³ | EN; HM; HP; UR | 1000 | HEAST | 10/4/2021 |
| Pentachlorophenol | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Pentachlorophenol | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Pesticides | | | | | | | |
| 4,4'-DDD | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,4'-DDD | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,4'-DDE | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,4'-DDE | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,4'-DDT | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| 4,4'-DDT | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aldrin | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aldrin | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| alpha-BHC | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| alpha-BHC | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dieldrin | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |

Table 5-2
Non-Cancer Toxicity Data - Inhalation
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Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Dieldrin | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Heptachlor | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Heptachlor | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Heptachlor epoxide | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Heptachlor epoxide | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Toxaphene | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Toxaphene | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | |
| Aroclor 1221 | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1221 | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1232 | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1232 | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1242 | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1242 | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1248 | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1248 | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1254 | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1254 | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1260 | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Aroclor 1260 | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Dioxins/Furans | | | | | | | |
| 2,3,7,8-TCDD TEQ | Chronic | 0.00000004 | mg/m³ | -- | N/A | CALEPA | 10/4/2021 |
| 2,3,7,8-TCDD TEQ | Subchronic | -- | mg/m³ | -- | -- | -- | 10/4/2021 |
| Cyanide | | | | | | | |
| Cyanide | Chronic | 0.0008 | mg/m³ | -- | -- | -- | 10/4/2021 |
| Cyanide | Subchronic | 0.0008 | mg/m³ | -- | -- | -- | 10/4/2021 |
| Metals | | | | | | | |
| Aluminum | Chronic | 0.005 | mg/m³ | NV | 300 | PPRTV Current | 10/4/2021 |
| Aluminum | Subchronic | 0.005 | mg/m³ | NV | 300 | PPRTV Current | 10/4/2021 |
| Antimony | Chronic | 0.0003 | mg/m³ | RS | 30 | ATSDR Final | 10/4/2021 |
| Antimony | Subchronic | 0.001 | mg/m³ | RS | 100 | ATSDR Final | 10/4/2021 |
| Arsenic | Chronic | 0.000015 | mg/m³ | CV; DM; DV; NV; RP; RS | N/A | Cal EPA | 10/4/2021 |
| Arsenic | Subchronic | 0.000015 | mg/m³ | CV; DM; DV; NV; RP; RS | N/A | Cal EPA | 10/4/2021 |
| Barium | Chronic | 0.0005 | mg/m³ | RP | 1000 | HEAST Current | 10/4/2021 |
| Barium | Subchronic | 0.005 | mg/m³ | RP | 100 | HEAST Current | 10/4/2021 |
| Beryllium | Chronic | 0.00002 | mg/m³ | IM; RS | 10 | IRIS | 10/4/2021 |
| Beryllium | Subchronic | 0.00002 | mg/m³ | IM; RS | 10 | IRIS | 10/4/2021 |
| Cadmium (Diet) | Chronic | 0.00001 | mg/m³ | UR | 3 | ATSDR Final | 10/4/2021 |

Table 5-2
Non-Cancer Toxicity Data - Inhalation
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| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Cadmium (Diet) | Subchronic | 0.0009 | mg/m³ | UR | N/A | PPRTV Archive | 10/4/2021 |
| Cadmium (Water) | Chronic | 0.00001 | mg/m³ | UR | 3 | ATSDR | 10/4/2021 |
| Cadmium (Water) | Subchronic | 0.00001 | mg/m³ | UR | 3 | ATSDR | 10/4/2021 |
| Chromium, Total | Chronic | 0.000008 | mg/m³ | RS | 300 | IRIS | 10/4/2021 |
| Chromium, Total | Subchronic | 0.0003 | mg/m³ | RS | 30 | ATSDR Final | 10/4/2021 |
| Cobalt | Chronic | 0.000006 | mg/m³ | RS | 300 | PPRTV Current | 10/4/2021 |
| Cobalt | Subchronic | 0.00002 | mg/m³ | RS | 100 | PPRTV Current | 10/4/2021 |
| Copper | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Copper | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Cyanide | Chronic | 0.0008 | mg/m³ | EN | 3000 | -- | 10/4/2021 |
| Cyanide | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Iron | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Iron | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Manganese | Chronic | 0.00005 | mg/m³ | NV | 1000 | IRIS | 10/4/2021 |
| Manganese | Subchronic | 0.00005 | mg/m³ | NV | 1000 | IRIS | 10/4/2021 |
| Mercury | Chronic | 0.0003 | mg/m³ | NV | 30 | IRIS | 10/4/2021 |
| Mercury | Subchronic | 0.0003 | mg/m³ | NV | 30 | HEAST Current | 10/4/2021 |
| Nickel | Chronic | 0.00009 | mg/m³ | RS | 30 | ATSDR FINAL | 10/4/2021 |
| Nickel | Subchronic | 0.0002 | mg/m³ | RS | 30 | ATSDR FINAL | 10/4/2021 |
| Selenium | Chronic | 0.02 | mg/m³ | CV; HP; NV | N/A | Cal EPA | 10/4/2021 |
| Selenium | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Silver | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Silver | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Thallium | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Thallium | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Vanadium | Chronic | 0.0001 | mg/m³ | RS | -- | ATSDR FINAL | 10/4/2021 |
| Vanadium | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Zinc | Chronic | -- | -- | -- | -- | -- | 10/4/2021 |
| Zinc | Subchronic | -- | -- | -- | -- | -- | 10/4/2021 |

Notes:
-- = No Value
N/A = Not Available
RfC = Reference Concentration
µg/m³ = micrograms per cubic meter

Target Organ Source Information:
ATSDR = Agency for Toxic Substance & Disease Registry (https://www.atsdr.cdc.gov)
Cal EPA = California Environmental Protection Agency (https://calepa.ca.gov/)
HEAST = Health Effects Assessment Summary Table (https://www.epa-heast.ornl.gov/)
IRIS = Integrated Risk Information System (https://www.epa.gov/iris)
PPRTV = Provisional Peer-Reviewed Toxicity Values (https://www.hhpprtv.ornl.gov/)

Target Organ Codes:
CV = Cardiovascular
DM = Dermal
IM = Immune
NV = Nervous
RS = Respiratory
UR = Urinary

Table 5-2
Non-Cancer Toxicity Data - Inhalation
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Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Chronic/ Subchronic | Inhalation RfC | | Primary Target Organ/System(s) | Combined Uncertainty/ Modifying Factors | RfC: Target Organ(s) | |
|---|---|---|---|---|---|---|---|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| | | | | DV = Developmental | OC = Ocular | | |
| | | | | HM = Hematological | OT = Other | | |
| | | | | HP = Hepatic | RP = Reproductive | | |

Table 6-1
Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Oral Cancer Slope Factor | | Oral Absorption Effiency for Dermal [1] | Absorbed Cancer Slope Factor for Dermal [2] | | Weight of Evidence/ Cancer Guideline Description | Cancer Slope Factor | |
|---|---|---|---|---|---|---|---|---|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Volatile Organic Compounds (VOCs) | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 0.2 | kg-day/mg | 1 | 0.2 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| 1,1,2-Trichloroethane | 0.057 | kg-day/mg | 1 | 0.057 | kg-day/mg | C | IRIS | 10/4/2021 |
| 1,1-Dichloroethane | 0.0057 | kg-day/mg | 1 | 0.0057 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| 1,1-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 1,2,4-Trichlorobenzene | 0.029 | kg-day/mg | 1 | 0.029 | kg-day/mg | LI | PPRTV Current | 10/4/2021 |
| 1,2-Dibromo-3-chloropropane | 0.8 | kg-day/mg | 1 | 0.8 | kg-day/mg | LI | PPRTV Current | 10/4/2021 |
| 1,2-Dibromoethane | 2 | kg-day/mg | 1 | 2 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| 1,2-Dichloroethane | 0.091 | kg-day/mg | 1 | 0.091 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| 1,2-Dichloropropane | 0.0037 | kg-day/mg | 1 | 0.0037 | kg-day/mg | LI | PPRTV Current | 10/4/2021 |
| 1,4-Dichlorobenzene | 0.0054 | kg-day/mg | 1 | 0.0054 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Benzene | 0.055 | kg-day/mg | 1 | 0.055 | kg-day/mg | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Bromodichloromethane | 0.062 | kg-day/mg | 1 | 0.062 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Bromoform | 0.0079 | kg-day/mg | 1 | 0.0079 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Bromomethane | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Carbon Tetrachloride | 0.07 | kg-day/mg | 1 | 0.07 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Chlorobenzene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Chloroform | 0.031 | kg-day/mg | 1 | 0.031 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| Chloromethane | 0.013 | kg-day/mg | 1 | 0.013 | kg-day/mg | C | HEAST | 10/4/2021 |
| cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| cis-1,3-Dichloropropene | 0.1 | kg-day/mg | 1 | 0.1 | kg-day/mg | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Cyclohexane | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Dibromochloromethane | 0.084 | kg-day/mg | 1 | 0.084 | kg-day/mg | C | IRIS | 10/4/2021 |
| Dichlorodifluoromethane | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Ethylbenzene | 0.011 | kg-day/mg | 1 | 0.011 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| Hexachlorobutadiene | 0.078 | kg-day/mg | 1 | 0.078 | kg-day/mg | C | IRIS | 10/4/2021 |
| Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Methyl Tertiary Butyl Ether | 0.0018 | kg-day/mg | 1 | 0.0018 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| Methylene Chloride | 0.002 | kg-day/mg | 1 | 0.002 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Naphthalene | 0.12 | kg-day/mg | 1 | 0.12 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| Tetrachloroethene | 0.0021 | kg-day/mg | 1 | 0.0021 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Toluene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| trans-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| trans-1,3-Dichloropropene | 0.1 | kg-day/mg | 1 | 0.1 | kg-day/mg | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Trichloroethene | 0.046 | kg-day/mg | 1 | 0.046 | kg-day/mg | Carcinogenic to Humans | IRIS | 10/4/2021 |

Table 6-1
Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Oral Cancer Slope Factor | | Oral Absorption Effiency for Dermal [1] | Absorbed Cancer Slope Factor for Dermal [2] | | Weight of Evidence/ Cancer Guideline Description | Cancer Slope Factor | |
|---|---|---|---|---|---|---|---|---|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Vinyl Chloride | 0.72 | kg-day/mg | 1 | 0.72 | kg-day/mg | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | | | | |
| 1,1'-Biphenyl | 0.008 | kg-day/mg | 1 | 0.008 | kg-day/mg | Suggestive Evidence of CP | IRIS | 10/4/2021 |
| 1,2-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 1,3-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4,6-Trichlorophenol | 0.011 | kg-day/mg | 1 | 0.011 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| 2,4-Dinitrophenol | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 2,4-Dinitrotoluene | 0.31 | kg-day/mg | 1 | 0.31 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| 2,6-Dinitrotoluene | 1.5 | kg-day/mg | 1 | 1.5 | kg-day/mg | SU | PPRTV | 10/4/2021 |
| 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 2-Nitrophenol | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 3,3-Dichlorobenzidine | 0.45 | kg-day/mg | 1 | 0.45 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| 4-Chloroaniline | 0.2 | kg-day/mg | 1 | 0.2 | kg-day/mg | LI | PPRTV | 10/4/2021 |
| 4-Nitroaniline | 0.02 | kg-day/mg | 1 | 0.02 | kg-day/mg | SU | PPRTV | 10/4/2021 |
| 4-Nitrophenol | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Atrazine | 0.23 | kg-day/mg | 1 | 0.23 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| Benzo(a)anthracene | 0.1 | kg-day/mg | 1 | 0.1 | kg-day/mg | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Benzo(a)pyrene | 1 | kg-day/mg | 1 | 1 | kg-day/mg | Carcinogenic to Humans | IRIS | 10/4/2021 |
| Benzo(b)fluoranthene | 0.1 | kg-day/mg | 1 | 0.1 | kg-day/mg | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Benzo(k)fluoranthene | 0.01 | kg-day/mg | 1 | 0.01 | kg-day/mg | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Bis(2-chloroethyl)ether | 1.1 | kg-day/mg | 1 | 1.1 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| bis(2-Ethylhexyl)phthalate | 0.014 | kg-day/mg | 1 | 0.014 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Butylbenzylphthalate | 0.0019 | kg-day/mg | 1 | 0.0019 | kg-day/mg | C | IRIS | 10/4/2021 |
| Chrysene | 0.001 | kg-day/mg | 1 | 0.001 | kg-day/mg | Carcinogenic to Humans | IRIS | 10/4/2021 |
| Dibenz(a,h)anthracene | 1 | kg-day/mg | 1 | 1 | kg-day/mg | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Hexachlorobenzene | 1.6 | kg-day/mg | 1 | 1.6 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Hexachloroethane | 0.04 | kg-day/mg | 1 | 0.04 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Indeno(1,2,3-cd)pyrene | 0.1 | kg-day/mg | 1 | 0.1 | kg-day/mg | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| n-Nitrosodi-n-propylamine | 7 | kg-day/mg | 1 | 7 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Nitrobenzene | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Pentachlorophenol | 0.4 | kg-day/mg | 1 | 0.4 | kg-day/mg | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Pesticides | | | | | | | | |

Table 6-1
Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Oral Cancer Slope Factor | | Oral Absorption Effiency for Dermal [1] | Absorbed Cancer Slope Factor for Dermal [2] | | Weight of Evidence/ Cancer Guideline Description | Cancer Slope Factor | |
|---|---|---|---|---|---|---|---|---|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| 4,4'-DDD | 0.24 | kg-day/mg | 1 | 0.24 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| 4,4'-DDE | 0.34 | kg-day/mg | 1 | 0.34 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| 4,4'-DDT | 0.34 | kg-day/mg | 1 | 0.34 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Aldrin | 17 | kg-day/mg | 1 | 17 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| alpha-BHC | 6.3 | kg-day/mg | 1 | 6.3 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Dieldrin | 16 | kg-day/mg | 1 | 16 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Heptachlor | 4.5 | kg-day/mg | 1 | 4.5 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Heptachlor epoxide | 9.1 | kg-day/mg | 1 | 9.1 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Toxaphene | 1.1 | kg-day/mg | 1 | 1.1 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Polychlorinated Biphenyls (PCBs) | | | | | | | | |
| Aroclor 1221 | 2 | kg-day/mg | 1 | 2 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Aroclor 1232 | 2 | kg-day/mg | 1 | 2 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Aroclor 1242 | 2 | kg-day/mg | 1 | 2 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Aroclor 1248 | 2 | kg-day/mg | 1 | 2 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Aroclor 1254 | 2 | kg-day/mg | 1 | 2 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Aroclor 1260 | 2 | kg-day/mg | 1 | 2 | kg-day/mg | B2 | IRIS | 10/4/2021 |
| Dioxins/Furans | | | | | | | | |
| 2,3,7,8-TCDD TEQ | 130000 | kg-day/mg | 1 | 130000 | kg-day/mg | N/A | CALEPA | 10/4/2021 |
| Cyanide | | | | | | | | |
| Cyanide | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Metals | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Antimony | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Arsenic | 1.5 | kg-day/mg | 1 | 1.5 | kg-day/mg | A | IRIS | 10/4/2021 |
| Barium | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Beryllium | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Cadmium (Water) | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Chromium, Total | 0.5 | kg-day/mg | 0.025 | 20 | kg-day/mg | N/A | Cal EPA | 10/4/2021 |
| Cobalt | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Copper | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Cyanide | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Iron | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Manganese | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Mercury | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Nickel | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |

Table 6-1
Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Oral Cancer Slope Factor | | Oral Absorption Effiency for Dermal [1] | Absorbed Cancer Slope Factor for Dermal [2] | | Weight of Evidence/ Cancer Guideline Description | Cancer Slope Factor | |
|---|---|---|---|---|---|---|---|---|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Selenium | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Silver | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Thallium | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |

Table 6-1
Cancer Toxicity Data - Oral/Dermal
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Oral Cancer Slope Factor | | Oral Absorption Effiency for Dermal [1] | Absorbed Cancer Slope Factor for Dermal [2] | | Weight of Evidence/ Cancer Guideline Description | Cancer Slope Factor | |
|---|---|---|---|---|---|---|---|---|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Vanadium | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |
| Zinc | -- | -- | -- | -- | -- | -- | -- | 10/4/2021 |

Notes:

-- = No Value; $(mg/kg\text{-}day)^{-1}$ = one over milligrams per kilogram-day

(1) Source: U.S. Environmental Protection Agency (EPA) July 2004. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Office of Emergency and Remedial Response. Washington D.C. EPA/540/R/99/005.

(2) To derive the Absorbed Cancer Slope Factor for Dermal, the oral cancer slope factor is divided by the oral absorption efficiency for dermal.

Sources:

BaP x TEF = Carcinogencity determined by adjusting benzo(a)pyrene (BaP) by a toxicity equivalence factor (TEF)

Cal EPA = California Environmental Protection Agency (https://calepa.ca.gov/)

IRIS = Integrated Risk Information System (https://www.epa.gov/iris)

PPRTV = Provisional Peer Reviewed Toxicity Values for Superfund (https://hhpprtv.ornl.gov/)

USEPA, 1986 = Guidelines for Carcinogen Risk Assessment

USEPA, 1996 = Proposed Guidelines for Carcinogen Risk Assessment

USEPA, 2005 = Guidelines for Carcinogen Risk Assessment

Weight of Evidence:

A = Human Carcinogen (USEPA, 1986)

B2 = Probable Human Carcinogen - Based on Sufficient Evidence in Animals (USEPA, 1986)

C = Possible Human Carcinogen (USEPA, 1986)

Carcinogenic to Humans (USEPA, 2005)

Known/Likely Human Carcinogen (USEPA, 1996)

LI = Likely to be Carcinogenic to Humans (PPRTV)

Likely to be Carcinogenic to Humans (USEPA, 2005)

N/A = Not Available

SU = Suggestive Evidence of Carcinogenicity in Humans (PPRTV)

Table 6-2
Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Inhalation Unit Risk | | Weight of Evidence/ Cancer Guideline Description | Inhalation Unit Risk | |
|---|---|---|---|---|---|
| | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Volatile Organic Compounds (VOCs) | | | | | |
| 1,1,2,2-Tetrachloroethane | 0.000058 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| 1,1,2-Trichloroethane | 0.000016 | $m^3/\mu g$ | C | IRIS | 10/4/2021 |
| 1,1-Dichloroethane | 0.0000016 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| 1,1-Dichloroethene | -- | -- | -- | -- | 10/4/2021 |
| 1,2,4-Trichlorobenzene | -- | -- | -- | -- | 10/4/2021 |
| 1,2-Dibromo-3-chloropropane | 0.006 | $m^3/\mu g$ | LI | PPRTV Current | 10/4/2021 |
| 1,2-Dibromoethane | 0.0006 | $m^3/\mu g$ | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| 1,2-Dichloroethane | 0.000026 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| 1,2-Dichloropropane | 0.0000037 | $m^3/\mu g$ | LI | PPRTV Current | 10/4/2021 |
| 1,4-Dichlorobenzene | 0.000011 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| 2-Hexanone | -- | -- | -- | -- | 10/4/2021 |
| Benzene | 0.0000078 | $m^3/\mu g$ | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Bromodichloromethane | 0.000037 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Bromoform | 0.0000011 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Bromomethane | -- | -- | -- | -- | 10/4/2021 |
| Carbon Tetrachloride | 0.000006 | $m^3/\mu g$ | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Chlorobenzene | -- | -- | -- | -- | 10/4/2021 |
| Chloroform | 0.000023 | $m^3/\mu g$ | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Chloromethane | 0.0000018 | $m^3/\mu g$ | C | HEAST | 10/4/2021 |
| cis-1,2-Dichloroethene | -- | -- | -- | -- | 10/4/2021 |
| cis-1,3-Dichloropropene | 0.000004 | $m^3/\mu g$ | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Cyclohexane | -- | -- | -- | -- | 10/4/2021 |
| Dibromochloromethane | -- | -- | -- | -- | 10/4/2021 |
| Dichlorodifluoromethane | -- | -- | -- | -- | 10/4/2021 |
| Ethylbenzene | 0.0000025 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Hexachlorobutadiene | 0.000022 | $m^3/\mu g$ | C | IRIS | 10/4/2021 |
| Isopropylbenzene | -- | -- | -- | -- | 10/4/2021 |
| Methyl Tertiary Butyl Ether | 0.00000026 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Methylene Chloride | 0.00000001 | $m^3/\mu g$ | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Naphthalene | 0.000034 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Tetrachloroethene | 0.00000026 | $m^3/\mu g$ | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Toluene | -- | -- | -- | -- | 10/4/2021 |
| trans-1,2-Dichloroethene | -- | -- | -- | -- | 10/4/2021 |
| trans-1,3-Dichloropropene | 0.000004 | $m^3/\mu g$ | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Trichloroethene | 0.0000041 | $m^3/\mu g$ | Carcinogenic to Humans | IRIS | 10/4/2021 |
| Vinyl Chloride | 0.0000044 | $m^3/\mu g$ | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |

Table 6-2
Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Inhalation Unit Risk | | Weight of Evidence/ Cancer Guideline Description | Inhalation Unit Risk | |
|---|---|---|---|---|---|
| | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Xylenes, Total | -- | -- | -- | -- | 10/4/2021 |
| Semi-Volatile Organic Compounds (SVOCs) | | | | | |
| 1,1'-Biphenyl | -- | -- | -- | -- | 10/4/2021 |
| 1,2-Dichlorobenzene | -- | -- | -- | -- | 10/4/2021 |
| 1,3-Dichlorobenzene | -- | -- | -- | -- | 10/4/2021 |
| 2,4,6-Trichlorophenol | 0.0000031 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| 2,4-Dinitrophenol | -- | -- | -- | -- | 10/4/2021 |
| 2,4-Dinitrotoluene | 0.000089 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| 2,6-Dinitrotoluene | -- | -- | -- | -- | 10/4/2021 |
| 2-Methylnaphthalene | -- | -- | -- | -- | 10/4/2021 |
| 2-Nitrophenol | -- | -- | -- | -- | 10/4/2021 |
| 3,3-Dichlorobenzidine | 0.00034 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | 10/4/2021 |
| 4-Chloroaniline | -- | -- | -- | -- | 10/4/2021 |
| 4-Nitroaniline | -- | -- | -- | -- | 10/4/2021 |
| 4-Nitrophenol | -- | -- | -- | -- | 10/4/2021 |
| Atrazine | -- | -- | -- | -- | 10/4/2021 |
| Benzo(a)anthracene | 0.00006 | $m^3/\mu g$ | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Benzo(a)pyrene | 0.0006 | $m^3/\mu g$ | Carcinogenic to Humans | IRIS | 10/4/2021 |
| Benzo(b)fluoranthene | 0.00006 | $m^3/\mu g$ | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Benzo(k)fluoranthene | 0.000006 | $m^3/\mu g$ | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Bis(2-chloroethyl)ether | 0.00033 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| bis(2-Ethylhexyl)phthalate | 0.0000024 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Butylbenzylphthalate | -- | -- | -- | -- | 10/4/2021 |
| Chrysene | 0.0000006 | $m^3/\mu g$ | Carcinogenic to Humans | IRIS | 10/4/2021 |
| Dibenz(a,h)anthracene | 0.0006 | $m^3/\mu g$ | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| Dibenzofuran | -- | -- | -- | -- | 10/4/2021 |
| Hexachlorobenzene | 0.00046 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Hexachlorocyclopentadiene | -- | -- | -- | -- | 10/4/2021 |
| Hexachloroethane | 0.000011 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Indeno(1,2,3-cd)pyrene | 0.00006 | $m^3/\mu g$ | Carcinogenic to Humans | BaP x TEF | 10/4/2021 |
| n-Nitrosodi-n-propylamine | 0.002 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Nitrobenzene | 0.00004 | $m^3/\mu g$ | Likely to be Carcinogenic to Humans | IRIS | 10/4/2021 |
| Pentachlorophenol | 0.0000051 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Pesticides | | | | | |
| 4,4'-DDD | 0.000069 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| 4,4'-DDE | 0.000097 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |

Table 6-2
Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Inhalation Unit Risk | | Weight of Evidence/ Cancer Guideline Description | Inhalation Unit Risk | |
|---|---|---|---|---|---|
| | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| 4,4'-DDT | 0.000097 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Aldrin | 0.0049 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| alpha-BHC | 0.0018 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Dieldrin | 0.0046 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Heptachlor | 0.0013 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Heptachlor epoxide | 0.0026 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Toxaphene | 0.00032 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Polychlorinated Biphenyls (PCBs) | | | | | |
| Aroclor 1221 | 0.000571 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Aroclor 1232 | 0.000571 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Aroclor 1242 | 0.000571 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Aroclor 1248 | 0.000571 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Aroclor 1254 | 0.000571 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Aroclor 1260 | 0.000571 | $m^3/\mu g$ | B2 | IRIS | 10/4/2021 |
| Dioxins/Furans | | | | | |
| 2,3,7,8-TCDD TEQ | 38 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Cyanide | | | | | |
| Cyanide | -- | -- | -- | -- | 10/4/2021 |
| Metals | | | | | |
| Aluminum | -- | -- | -- | -- | 10/4/2021 |
| Antimony | -- | -- | -- | -- | 10/4/2021 |
| Arsenic | 0.0043 | $m^3/\mu g$ | A | IRIS | 10/4/2021 |
| Barium | -- | -- | -- | -- | 10/4/2021 |
| Beryllium | 0.0024 | $m^3/\mu g$ | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Cadmium (Diet) | 0.0018 | $m^3/\mu g$ | B1 | IRIS | 10/4/2021 |
| Cadmium (Water) | 0.0018 | $m^3/\mu g$ | B1 | IRIS | 10/4/2021 |
| Chromium, Total | 0.012 | $m^3/\mu g$ | Known/Likely Human Carcinogen | IRIS | 10/4/2021 |
| Cobalt | 0.009 | $m^3/\mu g$ | LI | PPRTV Current | 10/4/2021 |
| Copper | -- | -- | -- | -- | 10/4/2021 |
| Cyanide | -- | -- | -- | -- | 10/4/2021 |
| Iron | -- | -- | -- | -- | 10/4/2021 |
| Manganese | -- | -- | -- | -- | 10/4/2021 |
| Mercury | -- | -- | -- | -- | 10/4/2021 |
| Nickel | 0.00026 | $m^3/\mu g$ | N/A | Cal EPA | 10/4/2021 |
| Selenium | -- | -- | -- | -- | 10/4/2021 |
| Silver | -- | -- | -- | -- | 10/4/2021 |
| Thallium | -- | -- | -- | -- | 10/4/2021 |

Table 6-2
Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Inhalation Unit Risk | | Weight of Evidence/ Cancer Guideline Description | Inhalation Unit Risk | |
|---|---|---|---|---|---|
| | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Vanadium | -- | -- | -- | -- | 10/4/2021 |
| Zinc | -- | -- | -- | -- | 10/4/2021 |

Table 6-2
Cancer Toxicity Data - Inhalation
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| Constituent of Interest | Inhalation Unit Risk | | Weight of Evidence/ Cancer Guideline Description | Inhalation Unit Risk | |
|---|---|---|---|---|---|
| | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |

Notes:
-- = No Value
$(\mu g/m^3)^{-1}$ = one over micrograms per cubic meter

Sources:
BaP x TEF = Carcinogencity determined by adjusting benzo(a)pyrene (BaP) by a toxicity equivalence factor (TEF)
Cal EPA = California Environmental Protection Agency (https://calepa.ca.gov/)
IRIS = Integrated Risk Information System (https://www.epa.gov/iris)
PPRTV = Provisional Peer Reviewed Toxicity Values for Superfund (https://hhpprtv.ornl.gov/)
USEPA, 1986 = *Guidelines for Carcinogen Risk Assessment*
USEPA, 1996 = *Proposed Guidelines for Carcinogen Risk Assessment*
USEPA, 2005 = *Guidelines for Carcinogen Risk Assessment*

Weight of Evidence:
A = Human Carcinogen (USEPA, 1986)
B1 = Probable Human Carcinogen - Based on Limited Evidence in Humans (USEPA, 1986)
B2 = Probable Human Carcinogen - Based on Sufficient Evidence in Animals (USEPA, 1986)
C = Possible Human Carcinogen (USEPA, 1986)
Carcinogenic to Humans (USEPA, 2005)
Known/Likely Human Carcinogen (USEPA, 1996)
LI = Likely to be Carcinogenic to Humans (PPRTV)
Likely to be Carcinogenic to Humans (USEPA, 2005)
N/A = Not Available

# Calculation of Chemical Cancer Risks and Non-Cancer Hazards: Reasonable Maximum Exposure

Table 7-1.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 6.85E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 7E-08 | 1.92E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 1.89E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-07 | 5.30E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 3.83E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | 1.07E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.07E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-07 | 2.99E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 2.89E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 7E-09 | 8.09E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 7.10E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 9E-07 | 1.99E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 5.58E-03 | mg/kg-day | -- | -- | -- | 1.56E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.02 |
| | | | | Antimony | 3.29E+01 | mg/kg | 9.06E-06 | mg/kg-day | -- | -- | -- | 2.54E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.06 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 8.27E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-06 | 2.31E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 5.61E-06 | mg/kg-day | -- | -- | -- | 1.57E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 4.59E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-05 | 1.29E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.04 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 2.83E-06 | mg/kg-day | -- | -- | -- | 7.91E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Copper | 2.42E+03 | mg/kg | 6.66E-04 | mg/kg-day | -- | -- | -- | 1.86E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.06 |
| | | | | Iron | 4.73E+04 | mg/kg | 1.30E-02 | mg/kg-day | -- | -- | -- | 3.64E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.05 |
| | | | | Manganese | 4.21E+02 | mg/kg | 1.16E-04 | mg/kg-day | -- | -- | -- | 3.25E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.01 |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.16E-07 | mg/kg-day | -- | -- | -- | 6.05E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.38E-04 | mg/kg-day | -- | -- | -- | 3.87E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 5.20E+01 | mg/kg | 1.43E-05 | mg/kg-day | -- | -- | -- | 4.01E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.008 |
| | | | | Thallium | 8.63E-02 | mg/kg | 2.37E-08 | mg/kg-day | -- | -- | -- | 6.65E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 5.85E-06 | mg/kg-day | -- | -- | -- | 1.64E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.70E+03 | mg/kg | 4.66E-04 | mg/kg-day | -- | -- | -- | 1.31E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | 3E-05 | | | | | 0.4 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 3.77E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | 1.06E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 1.04E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-07 | 2.92E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 2.10E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 5.89E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 5.87E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 6E-08 | 1.64E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.22E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-09 | 3.42E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 9.02E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 2.52E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 2.36E-04 | mg/kg-day | -- | -- | -- | 6.61E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0007 |
| | | | | Antimony | 3.29E+01 | mg/kg | 3.84E-07 | mg/kg-day | -- | -- | -- | 1.07E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.02 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 1.75E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-07 | 4.90E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 2.38E-08 | mg/kg-day | -- | -- | -- | 6.65E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.003 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.94E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 4E-05 | 5.44E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.07 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 1.20E-07 | mg/kg-day | -- | -- | -- | 3.35E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Copper | 2.42E+03 | mg/kg | 2.82E-05 | mg/kg-day | -- | -- | -- | 7.89E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.002 |
| | | | | Iron | 4.73E+04 | mg/kg | 5.51E-04 | mg/kg-day | -- | -- | -- | 1.54E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Manganese | 4.21E+02 | mg/kg | 4.91E-06 | mg/kg-day | -- | -- | -- | 1.37E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.01 |

Table 7-1.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | 9.14E-09 | mg/kg-day | -- | -- | -- | 2.56E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.002 |
| | | | | Nickel | 5.02E+02 | mg/kg | 5.85E-06 | mg/kg-day | -- | -- | -- | 1.64E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.02 |
| | | | | Silver | 5.20E+01 | mg/kg | 6.06E-07 | mg/kg-day | -- | -- | -- | 1.70E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.008 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.01E-09 | mg/kg-day | -- | -- | -- | 2.81E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.48E-07 | mg/kg-day | -- | -- | -- | 6.94E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.005 |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.97E-05 | mg/kg-day | -- | -- | -- | 5.53E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | 4E-05 | | | | | 0.2 |
| | | Exp. Point Total | | | | | | | | | 6E-05 | | | | | 0.5 |
| | Exp. Medium Total | | | | | | | | | | 6E-05 | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | 1.34E-07 | µg/m³ | 6.00E-05 | m³/µg | 8E-12 | 3.76E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | 3.71E-08 | µg/m³ | 6.00E-04 | m³/µg | 2E-11 | 1.04E-07 | µg/m³ | 2.00E-03 | µg/m³ | 0.00005 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | 7.50E-08 | µg/m³ | 6.00E-05 | m³/µg | 5E-12 | 2.10E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.09E-08 | µg/m³ | 6.00E-04 | m³/µg | 1E-11 | 5.87E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 5.67E-09 | µg/m³ | 6.90E-05 | m³/µg | 4E-13 | 1.59E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.39E-12 | µg/m³ | 3.80E+01 | m³/µg | 5E-11 | 3.90E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.0000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | 1.09E-03 | µg/m³ | -- | -- | -- | 3.07E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0006 |
| | | | | Antimony | 2.42E-05 | µg/m³ | 1.78E-06 | µg/m³ | -- | -- | -- | 4.98E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00002 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | 2.70E-07 | µg/m³ | 4.30E-03 | m³/µg | 1E-09 | 7.57E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00005 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | 1.10E-06 | µg/m³ | 1.80E-03 | m³/µg | 2E-09 | 3.08E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0003 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | 9.00E-06 | µg/m³ | 1.20E-02 | m³/µg | 1E-07 | 2.52E-05 | µg/m³ | 8.00E-03 | µg/m³ | 0.003 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | 5.54E-07 | µg/m³ | 9.00E-03 | m³/µg | 5E-09 | 1.55E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0003 |
| | | | | Copper | 1.78E-03 | µg/m³ | 1.31E-04 | µg/m³ | -- | -- | -- | 3.66E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | 2.55E-03 | µg/m³ | -- | -- | -- | 7.14E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | 2.27E-05 | µg/m³ | -- | -- | -- | 6.37E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.001 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 4.24E-08 | µg/m³ | -- | -- | -- | 1.19E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 2.71E-05 | µg/m³ | 2.60E-04 | m³/µg | 7E-09 | 7.59E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0008 |
| | | | | Silver | 3.83E-05 | µg/m³ | 2.81E-06 | µg/m³ | -- | -- | -- | 7.86E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 4.66E-09 | µg/m³ | -- | -- | -- | 1.30E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.15E-06 | µg/m³ | -- | -- | -- | 3.22E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00003 |
| | | | | Zinc | 1.25E-03 | µg/m³ | 9.15E-05 | µg/m³ | -- | -- | -- | 2.56E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.007 |
| | | Exp. Point Total | | | | | | | | | 1E-07 | | | | | 0.007 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.57E-04 | µg/m³ | 1.16E-05 | µg/m³ | 6.00E-05 | m³/µg | 7E-10 | 3.24E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.29E-09 | µg/m³ | 3.88E-10 | µg/m³ | 3.80E+01 | m³/µg | 1E-08 | 1.09E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.05E-02 | µg/m³ | 7.71E-04 | µg/m³ | -- | -- | -- | 2.16E-03 | µg/m³ | 3.00E-01 | µg/m³ | 0.007 |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | 0.007 |
| | | Exp. Point Total | | | | | | | | | 2E-08 | | | | | 0.007 |
| | Exp. Medium Total | | | | | | | | | | 1E-07 | | | | | 0.01 |

Table 7-1.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Medium Total | | | | | | | | | | | 7E-05 | | | | | 0.5 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.27E-06 | µg/m³ | 2.60E-05 | m³/µg | 3E-11 | 3.57E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 4.83E-04 | µg/m³ | 7.80E-06 | m³/µg | 4E-09 | 1.35E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00005 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 9.69E-07 | µg/m³ | 2.30E-05 | m³/µg | 2E-11 | 2.71E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000003 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.23E-05 | µg/m³ | -- | -- | -- | 3.45E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 5.40E-04 | µg/m³ | 2.50E-06 | m³/µg | 1E-09 | 1.51E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000002 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 5.57E-05 | µg/m³ | -- | -- | -- | 1.56E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000004 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 2.30E-05 | µg/m³ | 3.40E-05 | m³/µg | 8E-10 | 6.45E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 9.39E-06 | µg/m³ | 2.60E-07 | m³/µg | 2E-12 | 2.63E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000007 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 1.71E-03 | µg/m³ | -- | -- | -- | 4.80E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.000001 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 1.83E-06 | µg/m³ | 4.10E-06 | m³/µg | 8E-12 | 5.14E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000003 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 1.44E-03 | µg/m³ | -- | -- | -- | 4.04E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 3.48E-07 | µg/m³ | -- | -- | -- | 9.75E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 5.85E-06 | µg/m³ | -- | -- | -- | 1.64E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 3.33E-10 | µg/m³ | 6.00E-05 | m³/µg | 2E-14 | 9.31E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 6.61E-08 | µg/m³ | -- | -- | -- | 1.85E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 7.24E-13 | µg/m³ | 3.80E+01 | m³/µg | 3E-11 | 2.03E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 9.74E-08 | µg/m³ | -- | -- | -- | 2.73E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000009 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 0.5 |
| | | | | | | | | | | | 7E-05 | | | | | Total of Receptor Hazards Across All Media |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-2.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 1.59E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 3.72E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 4.41E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-08 | 1.03E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 8.90E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-09 | 2.08E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 2.48E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-08 | 5.80E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 2.24E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 5E-10 | 1.57E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 5.51E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 7E-08 | 3.86E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 4.33E-04 | mg/kg-day | -- | -- | -- | 3.03E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.003 |
| | | | | Antimony | 3.29E+01 | mg/kg | 7.03E-07 | mg/kg-day | -- | -- | -- | 4.92E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.01 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 6.41E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 4.49E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 4.36E-07 | mg/kg-day | -- | -- | -- | 3.05E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.003 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.07E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 5E-06 | 2.49E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.008 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 2.19E-07 | mg/kg-day | -- | -- | -- | 1.53E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Copper | 2.42E+03 | mg/kg | 5.16E-05 | mg/kg-day | -- | -- | -- | 3.61E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.01 |
| | | | | Iron | 4.73E+04 | mg/kg | 1.01E-03 | mg/kg-day | -- | -- | -- | 7.06E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Manganese | 4.21E+02 | mg/kg | 8.99E-06 | mg/kg-day | -- | -- | -- | 6.29E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.003 |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.68E-08 | mg/kg-day | -- | -- | -- | 1.17E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.0007 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.07E-05 | mg/kg-day | -- | -- | -- | 7.50E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.004 |
| | | | | Silver | 5.20E+01 | mg/kg | 1.11E-06 | mg/kg-day | -- | -- | -- | 7.78E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.84E-09 | mg/kg-day | -- | -- | -- | 1.29E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.001 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 4.54E-07 | mg/kg-day | -- | -- | -- | 3.18E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.0006 |
| | | | | Zinc | 1.70E+03 | mg/kg | 3.62E-05 | mg/kg-day | -- | -- | -- | 2.53E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0008 |
| | | | Exp. Route Total | | | | | | | | 6E-06 | | | | | 0.07 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 1.81E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-09 | 1.81E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 5.01E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-09 | 5.01E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 1.01E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-09 | 1.01E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 2.83E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-09 | 2.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.40E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-09 | 5.88E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 6.19E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 8E-08 | 4.34E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 1.62E-04 | mg/kg-day | -- | -- | -- | 1.14E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Antimony | 3.29E+01 | mg/kg | 2.64E-07 | mg/kg-day | -- | -- | -- | 1.84E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.03 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 1.20E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | 8.41E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 1.63E-08 | mg/kg-day | -- | -- | -- | 1.14E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 9.34E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-06 | 9.34E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.1 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 8.22E-08 | mg/kg-day | -- | -- | -- | 5.75E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Copper | 2.42E+03 | mg/kg | 1.94E-05 | mg/kg-day | -- | -- | -- | 1.36E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.004 |
| | | | | Iron | 4.73E+04 | mg/kg | 3.78E-04 | mg/kg-day | -- | -- | -- | 2.65E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Manganese | 4.21E+02 | mg/kg | 3.37E-06 | mg/kg-day | -- | -- | -- | 2.36E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.02 |

Table 7-2.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.28E-09 | mg/kg-day | -- | -- | -- | 4.40E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.02E-06 | mg/kg-day | -- | -- | -- | 2.81E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.04 |
| | | | | Silver | 5.20E+01 | mg/kg | 4.16E-07 | mg/kg-day | -- | -- | -- | 2.91E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.01 |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.91E-10 | mg/kg-day | -- | -- | -- | 4.83E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.70E-07 | mg/kg-day | -- | -- | -- | 1.19E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.009 |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.36E-05 | mg/kg-day | -- | -- | -- | 9.50E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | 8E-06 | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | 8E-06 | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | 7.74E-09 | µg/m³ | 6.00E-05 | m³/µg | 5E-13 | 1.81E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | 2.14E-09 | µg/m³ | 6.00E-04 | m³/µg | 1E-12 | 4.99E-09 | µg/m³ | 2.00E-03 | µg/m³ | 0.000002 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | 4.32E-09 | µg/m³ | 6.00E-05 | m³/µg | 3E-13 | 1.01E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 1.21E-09 | µg/m³ | 6.00E-04 | m³/µg | 7E-13 | 2.82E-09 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.09E-10 | µg/m³ | 6.90E-05 | m³/µg | 8E-15 | 7.62E-10 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 2.67E-14 | µg/m³ | 3.80E+01 | m³/µg | 1E-12 | 1.87E-13 | µg/m³ | 4.00E-05 | µg/m³ | 5E-09 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | 2.10E-05 | µg/m³ | -- | -- | -- | 1.47E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00003 |
| | | | | Antimony | 2.42E-05 | µg/m³ | 3.41E-08 | µg/m³ | -- | -- | -- | 2.39E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000008 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | 5.19E-09 | µg/m³ | 4.30E-03 | m³/µg | 2E-11 | 3.63E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000002 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | 2.11E-08 | µg/m³ | 1.80E-03 | m³/µg | 4E-11 | 1.48E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | 5.19E-07 | µg/m³ | 1.20E-02 | m³/µg | 6E-09 | 1.21E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0002 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | 1.06E-08 | µg/m³ | 9.00E-03 | m³/µg | 1E-10 | 7.45E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.00001 |
| | | | | Copper | 1.78E-03 | µg/m³ | 2.51E-06 | µg/m³ | -- | -- | -- | 1.76E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | 4.90E-05 | µg/m³ | -- | -- | -- | 3.43E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | 4.37E-07 | µg/m³ | -- | -- | -- | 3.06E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.00006 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 8.14E-10 | µg/m³ | -- | -- | -- | 5.70E-09 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 5.20E-07 | µg/m³ | 2.60E-04 | m³/µg | 1E-10 | 3.64E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00004 |
| | | | | Silver | 3.83E-05 | µg/m³ | 5.39E-08 | µg/m³ | -- | -- | -- | 3.78E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 8.95E-11 | µg/m³ | -- | -- | -- | 6.26E-10 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 2.20E-08 | µg/m³ | -- | -- | -- | 1.54E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000002 |
| | | | | Zinc | 1.25E-03 | µg/m³ | 1.76E-06 | µg/m³ | -- | -- | -- | 1.23E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 7E-09 | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | 7E-09 | | | | | 0.0003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E-04 | µg/m³ | 1.05E-06 | µg/m³ | 6.00E-05 | m³/µg | 6E-11 | 2.46E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 8.37E-09 | µg/m³ | 1.18E-11 | µg/m³ | 3.80E+01 | m³/µg | 4E-10 | 8.25E-11 | µg/m³ | 4.00E-05 | µg/m³ | 0.000002 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 6.37E-02 | µg/m³ | 8.98E-05 | µg/m³ | -- | -- | -- | 6.28E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.002 |
| | | | Exp. Route Total | | | | | | | | 5E-10 | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | 5E-10 | | | | | 0.002 |
| | Exp. Medium Total | | | | | | | | | | 7E-09 | | | | | 0.002 |

Table 7-2.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Medium Total | | | | | | | | | | | 8E-06 | | | | | 0.3 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 8E-06 | | | | Total of Receptor Hazards Across All Media | 0.3 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-3.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.77E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.90E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 9.90E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.76E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.48E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.02 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.84E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.3 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.44E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.1 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.35E-04 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.6 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.14E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.07 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.45E-04 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.1 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.19E-03 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.4 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.32E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.2 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.72E-02 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.5 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.37E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.5 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.00E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.1 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.59E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.03 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.58E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.2 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.71E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.07 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 6.15E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.06 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.52E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.03 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.21E-02 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.04 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.47E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.51E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.05E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.53E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.77E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.006 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.31E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.43E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.003 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.57E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.09 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.54E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.45E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.82E-05 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.4 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.74E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 4.09E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.01 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 7.99E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 7.12E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.07 |

Table 7-3.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.33E-07 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.01 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 8.49E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.1 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.79E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.04 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.001 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.60E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.03 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.87E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.8 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 4 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 4 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.47E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-08 | µg/m³ | 2.00E-03 | µg/m³ | 0.00002 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | (2) | -- | -- | -- | -- | 8.19E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.29E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.19E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.52E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.20E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Antimony | 2.42E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.94E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.000006 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.95E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00002 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.20E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0001 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | (2) | -- | -- | -- | -- | 9.83E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.001 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.05E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.0001 |
| | | | | Copper | 1.78E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.43E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.79E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.48E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0005 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.63E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.96E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0003 |
| | | | | Silver | 3.83E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.07E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 5.09E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00001 |
| | | | | Zinc | 1.25E-03 | µg/m³ | (2) | -- | -- | -- | -- | 9.99E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.54E-04 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 4.16E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.26E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.005 |

Table 7-3.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Medium Total | | | | | | | | | | | -- | | | | | 4 |
| | | | | | | | | | Total of Receptor Risks Across All Media | | -- | | | Total of Receptor Hazards Across All Media | | 4 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-4.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.66E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.59E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 9.28E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.59E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.01E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.72E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.35E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.20E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.05 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.01E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.36E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.11E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.04 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.86E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.62E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.05 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.16E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.05 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.81E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.01 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.24E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.003 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.35E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.47E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.007 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 5.76E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.006 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.42E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.13E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.12E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.10E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 6.27E-08 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.75E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.64E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 2.69E-13 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.0004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 7.04E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00007 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.14E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.002 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.21E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.08E-09 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0003 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 5.79E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.008 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.56E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 8.40E-06 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0003 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.64E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0002 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.002 |

Table 7-4.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.72E-09 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0002 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.74E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.002 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.81E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0009 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 3.00E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.38E-08 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.0006 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 5.88E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.47E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-08 | µg/m³ | 2.00E-03 | µg/m³ | 0.00002 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | (2) | -- | -- | -- | -- | 8.19E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.29E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.19E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.52E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.20E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Antimony | 2.42E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.94E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.000006 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.95E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00002 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.20E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0001 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | (2) | -- | -- | -- | -- | 9.83E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.001 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.05E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.0001 |
| | | | | Copper | 1.78E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.43E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.79E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.48E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0005 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.63E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.96E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0003 |
| | | | | Silver | 3.83E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.07E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 5.09E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00001 |
| | | | | Zinc | 1.25E-03 | µg/m³ | (2) | -- | -- | -- | -- | 9.99E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.54E-04 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 4.16E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.26E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.005 |

Table 7-4.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Medium Total | | | | | | | | | | | -- | | | | | 0.3 |
| | | | | | | | | | Total of Receptor Risks Across All Media | | -- | | | Total of Receptor Hazards Across All Media | | 0.3 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-5.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 9.06E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 2.50E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 5.06E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.41E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.41E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 2.07E-11 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 1.62E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 3.29E+01 | mg/kg | 2.64E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 5.01E+00 | mg/kg | 2.41E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 1.63E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 6.07E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 1.03E+01 | mg/kg | 8.23E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.42E+03 | mg/kg | 1.94E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.73E+04 | mg/kg | 3.79E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.21E+02 | mg/kg | 3.38E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.29E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.02E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 5.20E+01 | mg/kg | 4.17E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.92E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.70E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.36E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 3.02E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 8.35E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 1.69E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.71E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.63E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 1.20E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 3.14E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 3.29E+01 | mg/kg | 5.10E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 5.01E+00 | mg/kg | 2.32E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 3.16E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.56E-05 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 1.03E+01 | mg/kg | 1.59E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.42E+03 | mg/kg | 3.74E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.73E+04 | mg/kg | 7.32E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.21E+02 | mg/kg | 6.52E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-5.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.22E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 7.77E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 5.20E+01 | mg/kg | 8.05E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.34E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 3.29E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.70E+03 | mg/kg | 2.62E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 6E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 6E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | 1.51E-07 | µg/m³ | 6.00E-05 | m³/µg | 9E-12 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | 4.17E-08 | µg/m³ | 6.00E-04 | m³/µg | 3E-11 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | 8.43E-08 | µg/m³ | 6.00E-05 | m³/µg | 5E-12 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.35E-08 | µg/m³ | 6.00E-04 | m³/µg | 1E-11 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 6.72E-09 | µg/m³ | 6.90E-05 | m³/µg | 5E-13 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.65E-12 | µg/m³ | 3.80E+01 | m³/µg | 6E-11 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | 1.30E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 2.42E-05 | µg/m³ | 2.11E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 3.68E-06 | µg/m³ | 3.20E-07 | µg/m³ | 4.30E-03 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | 1.31E-06 | µg/m³ | 1.80E-03 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | 1.01E-05 | µg/m³ | 1.20E-02 | m³/µg | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.56E-06 | µg/m³ | 6.57E-07 | µg/m³ | 9.00E-03 | m³/µg | 6E-09 | (2) | -- | -- | -- | -- |
| | | | | Copper | 1.78E-03 | µg/m³ | 1.55E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | 3.03E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | 2.70E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 5.77E-07 | µg/m³ | 5.02E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 3.69E-04 | µg/m³ | 3.21E-05 | µg/m³ | 2.60E-04 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Silver | 3.83E-05 | µg/m³ | 3.33E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 5.52E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.36E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.25E-03 | µg/m³ | 1.08E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-07 | | | | | -- |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.54E-04 | µg/m³ | 1.27E-05 | µg/m³ | 6.00E-05 | m³/µg | 8E-10 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | 4.52E-10 | µg/m³ | 3.80E+01 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | 8.97E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-08 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 2E-07 | | | | | -- |

Table 7-5.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Medium Total | | | | | | | | | | | 6E-04 | | | | | -- |
| | | | | | | | | | Total of Receptor Risks Across All Media | | 6E-04 | | | Total of Receptor Hazards Across All Media | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-6.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 3.17E-03 | mg/kg-day | -- | -- | -- | 8.87E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.009 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 4.89E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | 1.37E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 2.93E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-06 | 8.21E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 9.39E-07 | mg/kg-day | -- | -- | -- | 2.63E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Iron | 8.70E+03 | mg/kg | 2.39E-03 | mg/kg-day | -- | -- | -- | 6.70E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.00E-08 | mg/kg-day | -- | -- | -- | 8.40E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.008 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.04 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.34E-04 | mg/kg-day | -- | -- | -- | 3.76E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0004 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 1.03E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | 2.90E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.24E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-06 | 3.47E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.97E-08 | mg/kg-day | -- | -- | -- | 1.11E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.01E-04 | mg/kg-day | -- | -- | -- | 2.84E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0004 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.27E-09 | mg/kg-day | -- | -- | -- | 3.55E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 0.007 |
| | | Exp. Point Total | | | | | | | | | 5E-06 | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | 5E-06 | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 6.22E-04 | µg/m³ | -- | -- | -- | 1.74E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0003 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | 1.60E-07 | µg/m³ | 4.30E-03 | m³/µg | 7E-10 | 4.48E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00003 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | 5.75E-07 | µg/m³ | 1.20E-02 | m³/µg | 7E-09 | 1.61E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 1.84E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | 5.16E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00009 |
| | | | | Iron | 6.40E-03 | µg/m³ | 4.70E-04 | µg/m³ | -- | -- | -- | 1.31E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 5.88E-09 | µg/m³ | -- | -- | -- | 1.65E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-09 | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | 9E-09 | | | | | 0.0007 |
| | Exp. Medium Total | | | | | | | | | | 9E-09 | | | | | 0.0007 |
| Medium Total | | | | | | | | | | | 5E-06 | | | | | 0.05 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.27E-06 | µg/m³ | 2.60E-05 | m³/µg | 3E-11 | 3.57E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 4.83E-04 | µg/m³ | 7.80E-06 | m³/µg | 4E-09 | 1.35E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00005 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 9.69E-07 | µg/m³ | 2.30E-05 | m³/µg | 2E-11 | 2.71E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000003 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.23E-05 | µg/m³ | -- | -- | -- | 3.45E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 5.40E-04 | µg/m³ | 2.50E-06 | m³/µg | 1E-09 | 1.51E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000002 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 5.57E-05 | µg/m³ | -- | -- | -- | 1.56E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000004 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 2.30E-05 | µg/m³ | 3.40E-05 | m³/µg | 8E-10 | 6.45E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 9.39E-06 | µg/m³ | 2.60E-07 | m³/µg | 2E-12 | 2.63E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000007 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 1.71E-03 | µg/m³ | -- | -- | -- | 4.80E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.000001 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 1.83E-06 | µg/m³ | 4.10E-06 | m³/µg | 8E-12 | 5.14E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000003 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 1.44E-03 | µg/m³ | -- | -- | -- | 4.04E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-6.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 3.48E-07 | µg/m³ | -- | -- | -- | 9.75E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 5.85E-06 | µg/m³ | -- | -- | -- | 1.64E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 3.33E-10 | µg/m³ | 6.00E-05 | m³/µg | 2E-14 | 9.31E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 6.61E-08 | µg/m³ | -- | -- | -- | 1.85E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 7.24E-13 | µg/m³ | 3.80E+01 | m³/µg | 3E-11 | 2.03E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 9.74E-08 | µg/m³ | -- | -- | -- | 2.73E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000009 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 5E-06 | | | | | 0.05 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-7.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 2.46E-04 | mg/kg-day | -- | -- | -- | 1.72E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 3.79E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-08 | 2.65E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 6.82E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-07 | 1.59E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 7.28E-08 | mg/kg-day | -- | -- | -- | 5.10E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.86E-04 | mg/kg-day | -- | -- | -- | 1.30E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.09E-01 | mg/kg | 2.33E-09 | mg/kg-day | -- | -- | -- | 1.63E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | 0.008 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.22E-05 | mg/kg-day | -- | -- | -- | 6.45E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 7.11E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 4.98E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 5.97E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-07 | 5.97E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.008 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.73E-08 | mg/kg-day | -- | -- | -- | 1.91E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Iron | 8.70E+03 | mg/kg | 6.96E-05 | mg/kg-day | -- | -- | -- | 4.87E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0007 |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.72E-10 | mg/kg-day | -- | -- | -- | 6.11E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | 6E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 6E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.19E-05 | µg/m³ | -- | -- | -- | 8.35E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.00002 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | 3.07E-09 | µg/m³ | 4.30E-03 | m³/µg | 1E-11 | 2.15E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000001 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | 3.31E-08 | µg/m³ | 1.20E-02 | m³/µg | 4E-10 | 7.73E-08 | µg/m³ | 8.00E-03 | µg/m³ | 0.00001 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 3.54E-09 | µg/m³ | 9.00E-03 | m³/µg | 3E-11 | 2.47E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000004 |
| | | | | Iron | 6.40E-03 | µg/m³ | 9.02E-06 | µg/m³ | -- | -- | -- | 6.31E-05 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.13E-10 | µg/m³ | -- | -- | -- | 7.91E-10 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-10 | | | | | 0.00003 |
| | | Exp. Point Total | | | | | | | | | 4E-10 | | | | | 0.00003 |
| | Exp. Medium Total | | | | | | | | | | 4E-10 | | | | | 0.00003 |
| Medium Total | | | | | | | | | | | 6E-07 | | | | | 0.02 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 6E-07 | | | | Total of Receptor Hazards Across All Media | 0.02 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-8.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.20E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.08 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.27E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.04 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.59E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.03 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.43E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.08 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.20E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.09 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.76E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.08 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.4 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.95E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.50E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.80E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.02 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.77E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.47E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.84E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.4 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.79E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0001 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.75E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.28E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00008 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.01E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00003 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 5.13E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.43E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.4 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-9.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 7.69E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.008 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.19E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.11E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.002 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.28E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 5.81E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.008 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.28E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.00E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00004 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.08E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.70E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.18E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00004 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.02E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00004 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.78E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0008 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.04 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.04 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.79E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0001 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.75E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.28E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00008 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.01E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00003 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 5.13E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.43E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.04 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-10.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.23E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.96E+00 | mg/kg | 1.42E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.87E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.73E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 6.97E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.73E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.78E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.96E+00 | mg/kg | 1.38E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 9.95E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 5.28E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 1.35E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.69E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 4E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 4E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 7.37E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.18E-06 | µg/m³ | 1.90E-07 | µg/m³ | 4.30E-03 | m³/µg | 8E-10 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | 6.46E-07 | µg/m³ | 1.20E-02 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 2.18E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Iron | 6.40E-03 | µg/m³ | 5.57E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 6.98E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-08 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-08 | | | | | -- |
| Medium Total | | | | | | | | | | | 4E-05 | | | | | -- |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 4E-05 | | | | Total of Receptor Hazards Across All Media | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-11.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 8.56E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 5E-07 | 2.40E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.006 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.63E-05 | mg/kg-day | -- | -- | -- | 7.36E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Benzene | 1.61E+00 | mg/kg | 4.91E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-08 | 1.38E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.39E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-08 | 6.69E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00007 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 8.90E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-07 | 2.49E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 5.82E-06 | mg/kg-day | -- | -- | -- | 1.63E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00008 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.92E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | 5.37E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 7.03E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-06 | 1.97E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.07 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.05E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | 5.73E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.19E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-07 | 3.32E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.42E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | 3.97E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 3.21E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 8E-09 | 8.99E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 7.89E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-06 | 2.21E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 5.07E-03 | mg/kg-day | -- | -- | -- | 1.42E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Antimony | 8.07E+01 | mg/kg | 2.47E-05 | mg/kg-day | -- | -- | -- | 6.91E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.2 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.79E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-06 | 5.00E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 6.16E-06 | mg/kg-day | -- | -- | -- | 1.73E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.62E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 8E-06 | 4.55E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.02 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.00E-06 | mg/kg-day | -- | -- | -- | 5.61E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Copper | 2.32E+03 | mg/kg | 7.08E-04 | mg/kg-day | -- | -- | -- | 1.98E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.06 |
| | | | | Iron | 5.68E+04 | mg/kg | 1.74E-02 | mg/kg-day | -- | -- | -- | 4.86E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.07 |
| | | | | Manganese | 5.63E+02 | mg/kg | 1.72E-04 | mg/kg-day | -- | -- | -- | 4.82E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.02 |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.40E-07 | mg/kg-day | -- | -- | -- | 6.72E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.53E-04 | mg/kg-day | -- | -- | -- | 4.30E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 2.05E+01 | mg/kg | 6.28E-06 | mg/kg-day | -- | -- | -- | 1.76E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.004 |
| | | | | Thallium | 8.63E-02 | mg/kg | 2.64E-08 | mg/kg-day | -- | -- | -- | 7.39E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 6.50E-06 | mg/kg-day | -- | -- | -- | 1.82E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.004 |
| | | | | Zinc | 1.92E+03 | mg/kg | 5.87E-04 | mg/kg-day | -- | -- | -- | 1.64E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | 0.6 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 1.09E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 6E-08 | 3.04E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0008 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.34E-06 | mg/kg-day | -- | -- | -- | 9.35E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Benzene | 1.61E+00 | mg/kg | 1.04E-09 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 6E-11 | 2.91E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0000007 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 3.04E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-09 | 8.50E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000008 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.13E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-08 | 3.16E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 7.39E-07 | mg/kg-day | -- | -- | -- | 2.07E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.06E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | 2.95E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 3.87E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-06 | 1.08E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.04 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.13E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | 3.15E-06 | mg/kg-day | -- | -- | -- |

Table 7-11.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 6.53E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-08 | 1.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 7.80E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-08 | 2.18E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.36E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-09 | 3.80E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 1.00E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 2.80E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 2.15E-04 | mg/kg-day | -- | -- | -- | 6.01E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Antimony | 8.07E+01 | mg/kg | 1.04E-06 | mg/kg-day | -- | -- | -- | 2.92E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.05 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 3.78E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-07 | 1.06E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.61E-08 | mg/kg-day | -- | -- | -- | 7.31E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.003 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 6.88E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-05 | 1.93E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.03 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 8.48E-08 | mg/kg-day | -- | -- | -- | 2.38E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Copper | 2.32E+03 | mg/kg | 3.00E-05 | mg/kg-day | -- | -- | -- | 8.39E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.003 |
| | | | | Iron | 5.68E+04 | mg/kg | 7.35E-04 | mg/kg-day | -- | -- | -- | 2.06E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.003 |
| | | | | Manganese | 5.63E+02 | mg/kg | 7.29E-06 | mg/kg-day | -- | -- | -- | 2.04E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.02 |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.02E-08 | mg/kg-day | -- | -- | -- | 2.84E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.003 |
| | | | | Nickel | 5.02E+02 | mg/kg | 6.50E-06 | mg/kg-day | -- | -- | -- | 1.82E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.02 |
| | | | | Silver | 2.05E+01 | mg/kg | 2.66E-07 | mg/kg-day | -- | -- | -- | 7.44E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.004 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.12E-09 | mg/kg-day | -- | -- | -- | 3.13E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.75E-07 | mg/kg-day | -- | -- | -- | 7.71E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.006 |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.49E-05 | mg/kg-day | -- | -- | -- | 6.96E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | 0.2 |
| | | Exp. Point Total | | | | | | | | | 4E-05 | | | | | 0.8 |
| | Exp. Medium Total | | | | | | | | | | 4E-05 | | | | | 0.8 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 1.68E-06 | µg/m³ | 1.60E-05 | m³/µg | 3E-11 | 4.70E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00002 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 5.16E-06 | µg/m³ | -- | -- | -- | 1.44E-05 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000005 |
| | | | | Benzene | 1.18E-06 | µg/m³ | 9.63E-08 | µg/m³ | 7.80E-06 | m³/µg | 8E-13 | 2.70E-07 | µg/m³ | 3.00E+01 | µg/m³ | 9E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 4.69E-07 | µg/m³ | 2.50E-06 | m³/µg | 1E-12 | 1.31E-06 | µg/m³ | 1.00E+03 | µg/m³ | 1E-09 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 1.75E-07 | µg/m³ | 3.40E-05 | m³/µg | 6E-12 | 4.89E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.0000002 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 1.14E-06 | µg/m³ | -- | -- | -- | 3.20E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 3.76E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 1.05E-06 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 1.38E-06 | µg/m³ | 6.00E-04 | m³/µg | 8E-10 | 3.86E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.002 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 4.01E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 1.12E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.33E-08 | µg/m³ | 6.00E-04 | m³/µg | 1E-11 | 6.52E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 2.78E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 7.79E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 6.30E-09 | µg/m³ | 6.90E-05 | m³/µg | 4E-13 | 1.76E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.55E-12 | µg/m³ | 3.80E+01 | m³/µg | 6E-11 | 4.33E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.0000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 9.95E-04 | µg/m³ | -- | -- | -- | 2.79E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0006 |
| | | | | Antimony | 5.93E-05 | µg/m³ | 4.84E-06 | µg/m³ | -- | -- | -- | 1.35E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.00005 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 5.84E-07 | µg/m³ | 4.30E-03 | m³/µg | 3E-09 | 1.64E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.0001 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 1.21E-06 | µg/m³ | 1.80E-03 | m³/µg | 2E-09 | 3.39E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0003 |

Table 7-11.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 3.19E-06 | µg/m³ | 1.20E-02 | m³/µg | 4E-08 | 8.93E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.001 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 3.93E-07 | µg/m³ | 9.00E-03 | m³/µg | 4E-09 | 1.10E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0002 |
| | | | | Copper | 1.70E-03 | µg/m³ | 1.39E-04 | µg/m³ | -- | -- | -- | 3.89E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 3.41E-03 | µg/m³ | -- | -- | -- | 9.54E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 3.38E-05 | µg/m³ | -- | -- | -- | 9.46E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.002 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 4.71E-08 | µg/m³ | -- | -- | -- | 1.32E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 3.01E-05 | µg/m³ | 2.60E-04 | m³/µg | 8E-09 | 8.43E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0009 |
| | | | | Silver | 1.51E-05 | µg/m³ | 1.23E-06 | µg/m³ | -- | -- | -- | 3.45E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 5.18E-09 | µg/m³ | -- | -- | -- | 1.45E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.28E-06 | µg/m³ | -- | -- | -- | 3.57E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00004 |
| | | | | Zinc | 1.41E-03 | µg/m³ | 1.15E-04 | µg/m³ | -- | -- | -- | 3.23E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-08 | | | | | 0.007 |
| | | Exp. Point Total | | | | | | | | | 6E-08 | | | | | 0.007 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.41E+00 | µg/m³ | 1.96E-01 | µg/m³ | 1.60E-05 | m³/µg | 3E-06 | 5.49E-01 | µg/m³ | 2.00E-01 | µg/m³ | 3 |
| | | | | 2-Hexanone | 3.75E+00 | µg/m³ | 3.05E-01 | µg/m³ | -- | -- | -- | 8.55E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.03 |
| | | | | Benzene | 2.80E-01 | µg/m³ | 2.28E-02 | µg/m³ | 7.80E-06 | m³/µg | 2E-07 | 6.38E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.002 |
| | | | | Ethylbenzene | 8.03E-01 | µg/m³ | 6.55E-02 | µg/m³ | 2.50E-06 | m³/µg | 2E-07 | 1.83E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0002 |
| | | | | Naphthalene | 3.55E-02 | µg/m³ | 2.90E-03 | µg/m³ | 3.40E-05 | m³/µg | 1E-07 | 8.11E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.003 |
| | | | | Xylenes, Total | 1.70E+00 | µg/m³ | 1.39E-01 | µg/m³ | -- | -- | -- | 3.89E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.97E-04 | µg/m³ | 3.23E-05 | µg/m³ | 6.00E-05 | m³/µg | 2E-09 | 9.05E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.29E-09 | µg/m³ | 4.32E-10 | µg/m³ | 3.80E+01 | m³/µg | 2E-08 | 1.21E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.05E-02 | µg/m³ | 8.57E-04 | µg/m³ | -- | -- | -- | 2.40E-03 | µg/m³ | 3.00E-01 | µg/m³ | 0.008 |
| | | | Exp. Route Total | | | | | | | | 4E-06 | | | | | 3 |
| | | Exp. Point Total | | | | | | | | | 4E-06 | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | 4E-06 | | | | | 3 |
| Medium Total | | | | | | | | | | | 4E-05 | | | | | 4 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.42E-06 | µg/m³ | 2.60E-05 | m³/µg | 4E-11 | 3.96E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000006 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 5.37E-04 | µg/m³ | 7.80E-06 | m³/µg | 4E-09 | 1.50E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00005 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 1.08E-06 | µg/m³ | 2.30E-05 | m³/µg | 2E-11 | 3.01E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000003 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.37E-05 | µg/m³ | -- | -- | -- | 3.83E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 6.00E-04 | µg/m³ | 2.50E-06 | m³/µg | 1E-09 | 1.68E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000002 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 6.19E-05 | µg/m³ | -- | -- | -- | 1.73E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000004 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 2.56E-05 | µg/m³ | 3.40E-05 | m³/µg | 9E-10 | 7.17E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 1.04E-05 | µg/m³ | 2.60E-07 | m³/µg | 3E-12 | 2.92E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000007 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 1.91E-03 | µg/m³ | -- | -- | -- | 5.33E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.000001 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 2.04E-06 | µg/m³ | 4.10E-06 | m³/µg | 8E-12 | 5.71E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000003 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 1.60E-03 | µg/m³ | -- | -- | -- | 4.49E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 3.87E-07 | µg/m³ | -- | -- | -- | 1.08E-06 | µg/m³ | 4.00E-01 | µg/m³ | 0.000003 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 6.50E-06 | µg/m³ | -- | -- | -- | 1.82E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000006 |

Table 7-11.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 3.70E-10 | µg/m³ | 6.00E-05 | m³/µg | 2E-14 | 1.03E-09 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 7.35E-08 | µg/m³ | -- | -- | -- | 2.06E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 8.05E-13 | µg/m³ | 3.80E+01 | m³/µg | 3E-11 | 2.25E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 1.08E-07 | µg/m³ | -- | -- | -- | 3.03E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000001 |
| | | | Exp. Route Total | | | | | | | | 7E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 7E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 7E-09 | | | | | 0.0001 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 6.92E-02 | µg/m³ | 2.60E-05 | m³/µg | 2E-06 | 1.94E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.03 |
| | | | | Benzene | 4.76E+02 | µg/m³ | 3.88E+01 | µg/m³ | 7.80E-06 | m³/µg | 3E-04 | 1.09E+02 | µg/m³ | 3.00E+01 | µg/m³ | 4 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 2.45E+02 | µg/m³ | -- | -- | -- | 6.85E+02 | µg/m³ | 6.00E+03 | µg/m³ | 0.1 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 3.42E+01 | µg/m³ | 2.50E-06 | m³/µg | 9E-05 | 9.57E+01 | µg/m³ | 1.00E+03 | µg/m³ | 0.1 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 3.49E+00 | µg/m³ | -- | -- | -- | 9.77E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.02 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 1.76E-01 | µg/m³ | 3.40E-05 | m³/µg | 6E-06 | 4.93E-01 | µg/m³ | 3.00E+00 | µg/m³ | 0.2 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 8.24E-01 | µg/m³ | 2.60E-07 | m³/µg | 2E-07 | 2.31E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.06 |
| | | | | Toluene | 2.66E+03 | µg/m³ | 2.17E+02 | µg/m³ | -- | -- | -- | 6.07E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.1 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 1.18E-01 | µg/m³ | 4.10E-06 | m³/µg | 5E-07 | 3.31E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.2 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 1.06E+02 | µg/m³ | -- | -- | -- | 2.97E+02 | µg/m³ | 1.00E+02 | µg/m³ | 3 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 5.65E-03 | µg/m³ | -- | -- | -- | 1.58E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.04 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 8.64E-03 | µg/m³ | -- | -- | -- | 2.42E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.08 |
| | | | Exp. Route Total | | | | | | | | 4E-04 | | | | | 7 |
| | | Exp. Point Total | | | | | | | | | 4E-04 | | | | | 7 |
| | Exp. Medium Total | | | | | | | | | | 4E-04 | | | | | 7 |
| Medium Total | | | | | | | | | | | 4E-04 | | | | | 7 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 4E-04 | | | | | 11 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-12.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 1.13E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 6E-08 | 7.91E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.02 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.47E-06 | mg/kg-day | -- | -- | -- | 2.43E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.05 |
| | | | | Benzene | 1.61E+00 | mg/kg | 6.48E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 4E-09 | 4.54E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0005 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 3.16E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-09 | 2.21E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0004 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.17E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-08 | 8.22E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.00001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 7.68E-07 | mg/kg-day | -- | -- | -- | 5.38E-05 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 2.53E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-08 | 1.77E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 9.28E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 9E-07 | 6.50E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.2 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.70E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-08 | 1.89E-05 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.57E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-08 | 1.10E-06 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.87E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 1.31E-05 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 4.24E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 1E-09 | 2.97E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 1.04E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 7.29E-11 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 6.69E-04 | mg/kg-day | -- | -- | -- | 4.69E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.05 |
| | | | | Antimony | 8.07E+01 | mg/kg | 3.26E-06 | mg/kg-day | -- | -- | -- | 2.28E-04 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.6 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 2.36E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | 1.65E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 8.14E-07 | mg/kg-day | -- | -- | -- | 5.70E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.1 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 2.14E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-06 | 1.50E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.03 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.65E-07 | mg/kg-day | -- | -- | -- | 1.85E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.006 |
| | | | | Copper | 2.32E+03 | mg/kg | 9.35E-05 | mg/kg-day | -- | -- | -- | 6.54E-03 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.7 |
| | | | | Iron | 5.68E+04 | mg/kg | 2.29E-03 | mg/kg-day | -- | -- | -- | 1.61E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.2 |
| | | | | Manganese | 5.63E+02 | mg/kg | 2.27E-05 | mg/kg-day | -- | -- | -- | 1.59E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.07 |
| | | | | Mercury | 7.85E-01 | mg/kg | 3.17E-08 | mg/kg-day | -- | -- | -- | 2.22E-06 | mg/kg-day | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 2.03E-05 | mg/kg-day | -- | -- | -- | 1.42E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.07 |
| | | | | Silver | 2.05E+01 | mg/kg | 8.29E-07 | mg/kg-day | -- | -- | -- | 5.80E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Thallium | 8.63E-02 | mg/kg | 3.48E-09 | mg/kg-day | -- | -- | -- | 2.44E-07 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.006 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 8.59E-07 | mg/kg-day | -- | -- | -- | 6.01E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.006 |
| | | | | Zinc | 1.92E+03 | mg/kg | 7.75E-05 | mg/kg-day | -- | -- | -- | 5.43E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 2 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 1.09E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 6E-09 | 7.61E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.34E-07 | mg/kg-day | -- | -- | -- | 2.34E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.005 |
| | | | | Benzene | 1.61E+00 | mg/kg | 1.04E-10 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 6E-12 | 7.27E-09 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0000007 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 3.04E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-10 | 2.12E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.00004 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.13E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-09 | 7.91E-07 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 7.39E-08 | mg/kg-day | -- | -- | -- | 5.17E-06 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.00001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.06E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-08 | 7.39E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 3.87E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-07 | 2.71E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.09 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.13E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-08 | 7.88E-06 | mg/kg-day | -- | -- | -- |

Table 7-12.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 6.53E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-09 | 4.57E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 7.80E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-09 | 5.46E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.36E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-10 | 9.51E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 1.00E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-08 | 7.01E-12 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.0004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 2.15E-05 | mg/kg-day | -- | -- | -- | 1.50E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 8.07E+01 | mg/kg | 1.04E-07 | mg/kg-day | -- | -- | -- | 7.31E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.1 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 3.78E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-08 | 2.65E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0005 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.61E-09 | mg/kg-day | -- | -- | -- | 1.83E-07 | mg/kg-day | 1.25E-05 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 6.88E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-06 | 4.81E-06 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.04 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 8.48E-09 | mg/kg-day | -- | -- | -- | 5.94E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0002 |
| | | | | Copper | 2.32E+03 | mg/kg | 3.00E-06 | mg/kg-day | -- | -- | -- | 2.10E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.02 |
| | | | | Iron | 5.68E+04 | mg/kg | 7.35E-05 | mg/kg-day | -- | -- | -- | 5.15E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.007 |
| | | | | Manganese | 5.63E+02 | mg/kg | 7.29E-07 | mg/kg-day | -- | -- | -- | 5.10E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.05 |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.02E-09 | mg/kg-day | -- | -- | -- | 7.11E-08 | mg/kg-day | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 6.50E-07 | mg/kg-day | -- | -- | -- | 4.55E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.06 |
| | | | | Silver | 2.05E+01 | mg/kg | 2.66E-08 | mg/kg-day | -- | -- | -- | 1.86E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.009 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.12E-10 | mg/kg-day | -- | -- | -- | 7.82E-09 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.0002 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.75E-08 | mg/kg-day | -- | -- | -- | 1.93E-06 | mg/kg-day | 2.60E-04 | mg/kg-day | 0.007 |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.49E-06 | mg/kg-day | -- | -- | -- | 1.74E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.4 |
| | | Exp. Point Total | | | | | | | | | 5E-06 | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | 5E-06 | | | | | 3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.64E-03 | µg/m³ | 8.60E-06 | µg/m³ | 1.60E-05 | m³/µg | 1E-10 | 6.02E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0003 |
| | | | | 2-Hexanone | 8.10E-03 | µg/m³ | 2.64E-05 | µg/m³ | -- | -- | -- | 1.85E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00006 |
| | | | | Benzene | 1.51E-04 | µg/m³ | 4.93E-07 | µg/m³ | 7.80E-06 | m³/µg | 4E-12 | 3.45E-05 | µg/m³ | 8.00E+01 | µg/m³ | 0.0000004 |
| | | | | Ethylbenzene | 7.36E-04 | µg/m³ | 2.40E-06 | µg/m³ | 2.50E-06 | m³/µg | 6E-12 | 1.68E-04 | µg/m³ | 9.00E+03 | µg/m³ | 0.00000002 |
| | | | | Naphthalene | 2.74E-04 | µg/m³ | 8.94E-07 | µg/m³ | 3.40E-05 | m³/µg | 3E-11 | 6.26E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Xylenes, Total | 1.79E-03 | µg/m³ | 5.84E-06 | µg/m³ | -- | -- | -- | 4.09E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 5.91E-04 | µg/m³ | 1.93E-06 | µg/m³ | 6.00E-05 | m³/µg | 1E-10 | 1.35E-04 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.17E-03 | µg/m³ | 7.06E-06 | µg/m³ | 6.00E-04 | m³/µg | 4E-09 | 4.95E-04 | µg/m³ | 2.00E-03 | µg/m³ | 0.2 |
| | | | | Benzo(b)fluoranthene | 6.30E-04 | µg/m³ | 2.05E-06 | µg/m³ | 6.00E-05 | m³/µg | 1E-10 | 1.44E-04 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.65E-05 | µg/m³ | 1.19E-07 | µg/m³ | 6.00E-04 | m³/µg | 7E-11 | 8.34E-06 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.37E-04 | µg/m³ | 1.42E-06 | µg/m³ | 6.00E-05 | m³/µg | 9E-11 | 9.97E-05 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 9.89E-06 | µg/m³ | 3.23E-08 | µg/m³ | 6.90E-05 | m³/µg | 2E-12 | 2.26E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.43E-09 | µg/m³ | 7.92E-12 | µg/m³ | 3.80E+01 | m³/µg | 3E-10 | 5.55E-10 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.56E+00 | µg/m³ | 5.09E-03 | µg/m³ | -- | -- | -- | 3.57E-01 | µg/m³ | 5.00E+00 | µg/m³ | 0.07 |
| | | | | Antimony | 7.60E-03 | µg/m³ | 2.48E-05 | µg/m³ | -- | -- | -- | 1.73E-03 | µg/m³ | 1.00E+00 | µg/m³ | 0.002 |
| | | | | Arsenic | 9.17E-04 | µg/m³ | 2.99E-06 | µg/m³ | 4.30E-03 | m³/µg | 1E-08 | 2.09E-04 | µg/m³ | 1.50E-02 | µg/m³ | 0.01 |
| | | | | Cadmium (Diet) | 1.90E-03 | µg/m³ | 6.19E-06 | µg/m³ | 1.80E-03 | m³/µg | 1E-08 | 4.33E-04 | µg/m³ | 9.00E-01 | µg/m³ | 0.0005 |

Table 7-12.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 5.00E-03 | µg/m³ | 1.63E-05 | µg/m³ | 1.20E-02 | m³/µg | 2E-07 | 1.14E-03 | µg/m³ | 3.00E-01 | µg/m³ | 0.004 |
| | | | | Cobalt | 6.17E-04 | µg/m³ | 2.01E-06 | µg/m³ | 9.00E-03 | m³/µg | 2E-08 | 1.41E-04 | µg/m³ | 2.00E-02 | µg/m³ | 0.007 |
| | | | | Copper | 2.18E-01 | µg/m³ | 7.11E-04 | µg/m³ | -- | -- | -- | 4.98E-02 | µg/m³ | -- | -- | -- |
| | | | | Iron | 5.35E+00 | µg/m³ | 1.74E-02 | µg/m³ | -- | -- | -- | 1.22E+00 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 5.30E-02 | µg/m³ | 1.73E-04 | µg/m³ | -- | -- | -- | 1.21E-02 | µg/m³ | 5.00E-02 | µg/m³ | 0.2 |
| | | | | Mercury | 7.39E-05 | µg/m³ | 2.41E-07 | µg/m³ | -- | -- | -- | 1.69E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.00006 |
| | | | | Nickel | 4.73E-02 | µg/m³ | 1.54E-04 | µg/m³ | 2.60E-04 | m³/µg | 4E-08 | 1.08E-02 | µg/m³ | 2.00E-01 | µg/m³ | 0.05 |
| | | | | Silver | 1.93E-03 | µg/m³ | 6.31E-06 | µg/m³ | -- | -- | -- | 4.42E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.13E-06 | µg/m³ | 2.65E-08 | µg/m³ | -- | -- | -- | 1.86E-06 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 2.00E-03 | µg/m³ | 6.53E-06 | µg/m³ | -- | -- | -- | 4.57E-04 | µg/m³ | -- | -- | -- |
| | | | | Zinc | 1.81E-01 | µg/m³ | 5.90E-04 | µg/m³ | -- | -- | -- | 4.13E-02 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-07 | | | | | 0.6 |
| | | Exp. Point Total | | | | | | | | | 3E-07 | | | | | 0.6 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 1.46E+01 | µg/m³ | 4.76E-02 | µg/m³ | 1.60E-05 | m³/µg | 8E-07 | 3.33E+00 | µg/m³ | 2.00E+00 | µg/m³ | 2 |
| | | | | 2-Hexanone | 2.27E+01 | µg/m³ | 7.40E-02 | µg/m³ | -- | -- | -- | 5.18E+00 | µg/m³ | 3.00E+01 | µg/m³ | 0.2 |
| | | | | Benzene | 1.69E+00 | µg/m³ | 5.53E-03 | µg/m³ | 7.80E-06 | m³/µg | 4E-08 | 3.87E-01 | µg/m³ | 8.00E+01 | µg/m³ | 0.005 |
| | | | | Ethylbenzene | 4.87E+00 | µg/m³ | 1.59E-02 | µg/m³ | 2.50E-06 | m³/µg | 4E-08 | 1.11E+00 | µg/m³ | 9.00E+03 | µg/m³ | 0.0001 |
| | | | | Naphthalene | 2.15E-01 | µg/m³ | 7.02E-04 | µg/m³ | 3.40E-05 | m³/µg | 2E-08 | 4.91E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.02 |
| | | | | Xylenes, Total | 1.03E+01 | µg/m³ | 3.37E-02 | µg/m³ | -- | -- | -- | 2.36E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.006 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.40E-03 | µg/m³ | 7.84E-06 | µg/m³ | 6.00E-05 | m³/µg | 5E-10 | 5.49E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 3.21E-08 | µg/m³ | 1.05E-10 | µg/m³ | 3.80E+01 | m³/µg | 4E-09 | 7.32E-09 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 6.37E-02 | µg/m³ | 2.08E-04 | µg/m³ | -- | -- | -- | 1.45E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.05 |
| | | | Exp. Route Total | | | | | | | | 9E-07 | | | | | 2 |
| | | Exp. Point Total | | | | | | | | | 9E-07 | | | | | 2 |
| | Exp. Medium Total | | | | | | | | | | 1E-06 | | | | | 3 |
| Medium Total | | | | | | | | | | | 6E-06 | | | | | 5 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 1.93E-09 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 2E-10 | 1.35E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000007 |
| | | | | Benzene | 2.88E-01 | mg/L | 3.70E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-08 | 2.59E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.003 |
| | | | | Chloroform | 7.20E-04 | mg/L | 9.25E-10 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 3E-11 | 6.47E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000006 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.04E-08 | mg/kg-day | -- | -- | -- | 7.27E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00004 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 4.58E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 5E-09 | 3.21E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0006 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 4.55E-08 | mg/kg-day | -- | -- | -- | 3.18E-06 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.000008 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 7.14E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 9E-09 | 4.99E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000008 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 5.39E-09 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 1E-11 | 3.78E-07 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00005 |
| | | | | Toluene | 1.09E+00 | mg/L | 1.40E-06 | mg/kg-day | -- | -- | -- | 9.77E-05 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.0001 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.17E-09 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 5E-11 | 8.21E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0002 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 1.52E-06 | mg/kg-day | -- | -- | -- | 1.07E-04 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.76E-09 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 1E-11 | 1.24E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.14E-08 | mg/kg-day | -- | -- | -- | 1.50E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0004 |

Table 7-12.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 2.02E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-11 | 1.41E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 1.72E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-10 | 1.20E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00004 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 1.66E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-11 | 1.16E-08 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 6.16E-10 | mg/kg-day | -- | -- | -- | 4.32E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 2.68E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-09 | 1.87E-12 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.00009 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.24E-05 | mg/kg-day | -- | -- | -- | 8.65E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0009 |
| | | | | Antimony | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | -- | -- | -- | 8.99E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.0002 |
| | | | | Arsenic | 8.07E-03 | mg/L | 1.04E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-08 | 7.25E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Barium | 5.29E-02 | mg/L | 6.79E-08 | mg/kg-day | -- | -- | -- | 4.76E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | Beryllium | 5.60E-03 | mg/L | 7.19E-09 | mg/kg-day | -- | -- | -- | 5.03E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 8.64E-10 | mg/kg-day | -- | -- | -- | 6.05E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 1.60E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 8E-09 | 1.12E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0002 |
| | | | | Cobalt | 7.19E-03 | mg/L | 9.24E-09 | mg/kg-day | -- | -- | -- | 6.47E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0002 |
| | | | | Iron | 1.47E+01 | mg/L | 1.88E-05 | mg/kg-day | -- | -- | -- | 1.32E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Manganese | 7.38E-01 | mg/L | 9.47E-07 | mg/kg-day | -- | -- | -- | 6.63E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.003 |
| | | | | Mercury | 1.30E-04 | mg/L | 1.67E-10 | mg/kg-day | -- | -- | -- | 1.17E-08 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.67E-09 | mg/kg-day | -- | -- | -- | 1.17E-07 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.003 |
| | | | | Vanadium | 1.08E-02 | mg/L | 1.39E-08 | mg/kg-day | -- | -- | -- | 9.73E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | Zinc | 1.05E-01 | mg/L | 1.35E-07 | mg/kg-day | -- | -- | -- | 9.42E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00003 |
| | | | Exp. Route Total | | | | | | | | 6E-08 | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 6.39E-09 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 6E-10 | 4.48E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Benzene | 2.88E-01 | mg/L | 4.09E-06 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-07 | 2.86E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.03 |
| | | | | Chloroform | 7.20E-04 | mg/L | 5.19E-09 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-10 | 3.64E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000004 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 8.83E-08 | mg/kg-day | -- | -- | -- | 6.18E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0003 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 1.64E-05 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-07 | 1.15E-03 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.02 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 2.90E-06 | mg/kg-day | -- | -- | -- | 2.03E-04 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0005 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 2.59E-06 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 3E-07 | 1.81E-04 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0003 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 1.67E-07 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 3E-10 | 1.17E-05 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.001 |
| | | | | Toluene | 1.09E+00 | mg/L | 3.18E-05 | mg/kg-day | -- | -- | -- | 2.22E-03 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.003 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.14E-08 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 5E-10 | 8.01E-07 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.002 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 5.53E-05 | mg/kg-day | -- | -- | -- | 3.87E-03 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.01 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.37E-07 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 1E-09 | 9.62E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 1.53E-06 | mg/kg-day | -- | -- | -- | 1.07E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.03 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 5.38E-08 | mg/kg-day | -- | -- | -- | 3.77E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0009 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 8.30E-06 | mg/kg-day | -- | -- | -- | 5.81E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Antimony | 1.00E-03 | mg/L | 8.63E-10 | mg/kg-day | -- | -- | -- | 6.04E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.001 |
| | | | | Arsenic | 8.07E-03 | mg/L | 6.96E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 4.87E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Barium | 5.29E-02 | mg/L | 4.56E-08 | mg/kg-day | -- | -- | -- | 3.20E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0002 |
| | | | | Beryllium | 5.60E-03 | mg/L | 4.83E-09 | mg/kg-day | -- | -- | -- | 3.38E-07 | mg/kg-day | 3.50E-05 | mg/kg-day | 0.01 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 5.81E-10 | mg/kg-day | -- | -- | -- | 4.06E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 2.15E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 4E-07 | 1.51E-06 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.01 |
| | | | | Cobalt | 7.19E-03 | mg/L | 2.48E-09 | mg/kg-day | -- | -- | -- | 1.74E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00006 |

Table 7-12.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Iron | 1.47E+01 | mg/L | 1.27E-05 | mg/kg-day | -- | -- | -- | 8.86E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Manganese | 7.38E-01 | mg/L | 6.36E-07 | mg/kg-day | -- | -- | -- | 4.45E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.05 |
| | | | | Mercury | 1.30E-04 | mg/L | 1.12E-10 | mg/kg-day | -- | -- | -- | 7.85E-09 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.12E-09 | mg/kg-day | -- | -- | -- | 7.85E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.002 |
| | | | | Vanadium | 1.08E-02 | mg/L | 9.34E-09 | mg/kg-day | -- | -- | -- | 6.53E-07 | mg/kg-day | 2.60E-04 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.05E-01 | mg/L | 5.43E-08 | mg/kg-day | -- | -- | -- | 3.80E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00001 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.2 |
| | | Exp. Point Total | | | | | | | | | 1E-06 | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | 1E-06 | | | | | 0.2 |
| | Outdoor Air | Trench (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.19E+01 | µg/m³ | 9.69E-03 | µg/m³ | 2.60E-05 | m³/µg | 3E-07 | 6.78E-01 | µg/m³ | 7.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.69E+03 | µg/m³ | 2.20E+00 | µg/m³ | 7.80E-06 | m³/µg | 2E-05 | 1.54E+02 | µg/m³ | 8.00E+01 | µg/m³ | 2 |
| | | | | Chloroform | 5.42E+00 | µg/m³ | 4.42E-03 | µg/m³ | 2.30E-05 | m³/µg | 1E-07 | 3.09E-01 | µg/m³ | 2.44E+02 | µg/m³ | 0.001 |
| | | | | cis-1,2-Dichloroethene | 6.76E+01 | µg/m³ | 5.51E-02 | µg/m³ | -- | -- | -- | 3.86E+00 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 2.87E+03 | µg/m³ | 2.34E+00 | µg/m³ | 2.50E-06 | m³/µg | 6E-06 | 1.64E+02 | µg/m³ | 9.00E+03 | µg/m³ | 0.02 |
| | | | | Isopropylbenzene | 2.70E+02 | µg/m³ | 2.20E-01 | µg/m³ | -- | -- | -- | 1.54E+01 | µg/m³ | 9.00E+01 | µg/m³ | 0.2 |
| | | | | Naphthalene | 3.67E+02 | µg/m³ | 2.99E-01 | µg/m³ | 3.40E-05 | m³/µg | 1E-05 | 2.09E+01 | µg/m³ | 3.00E+00 | µg/m³ | 7 |
| | | | | Tetrachloroethene | 2.72E+01 | µg/m³ | 2.21E-02 | µg/m³ | 2.60E-07 | m³/µg | 6E-09 | 1.55E+00 | µg/m³ | 4.07E+01 | µg/m³ | 0.04 |
| | | | | Toluene | 9.37E+03 | µg/m³ | 7.64E+00 | µg/m³ | -- | -- | -- | 5.35E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.1 |
| | | | | Trichloroethene | 6.62E+00 | µg/m³ | 5.39E-03 | µg/m³ | 4.10E-06 | m³/µg | 2E-08 | 3.78E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.2 |
| | | | | Xylenes, Total | 9.51E+03 | µg/m³ | 7.75E+00 | µg/m³ | -- | -- | -- | 5.43E+02 | µg/m³ | 4.00E+02 | µg/m³ | 1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 7.81E+00 | µg/m³ | 6.37E-03 | µg/m³ | -- | -- | -- | 4.46E-01 | µg/m³ | 4.00E+00 | µg/m³ | 0.1 |
| | | | | 2-Methylnaphthalene | 1.05E+02 | µg/m³ | 8.60E-02 | µg/m³ | -- | -- | -- | 6.02E+00 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.31E-02 | µg/m³ | 4.33E-05 | µg/m³ | 6.00E-05 | m³/µg | 3E-09 | 3.03E-03 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 5.84E-01 | µg/m³ | 4.76E-04 | µg/m³ | -- | -- | -- | 3.33E-02 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 6.01E-05 | µg/m³ | 4.90E-08 | µg/m³ | 3.80E+01 | m³/µg | 2E-06 | 3.43E-06 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.63E-01 | µg/m³ | 6.22E-04 | µg/m³ | -- | -- | -- | 4.36E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.1 |
| | | | Exp. Route Total | | | | | | | | 4E-05 | | | | | 11 |
| | | Exp. Point Total | | | | | | | | | 4E-05 | | | | | 11 |
| | Exp. Medium Total | | | | | | | | | | 4E-05 | | | | | 11 |
| Medium Total | | | | | | | | | | | 4E-05 | | | | | 11 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 4E-05 | | | | | 16 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-13.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.58E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.09 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.10E-03 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.2 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.05E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.005 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.00E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.72E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.43E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.02E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.94E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 1 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.55E-05 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.96E-06 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.93E-05 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.34E-06 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.04 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 3.30E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.5 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.12E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.2 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.03E-03 | mg/kg-day | 4.00E-04 | mg/kg-day | 3 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.47E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.2 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.58E-04 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.3 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.79E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.2 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.38E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.3 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.96E-02 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.9 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 7.26E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 1 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 7.20E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.3 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.00E-05 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.06 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 6.42E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.3 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.63E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.05 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 1.10E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.1 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.72E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.05 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.46E-02 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.08 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 9 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.55E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.006 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.83E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.02 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.44E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000006 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.12E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00007 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.65E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.73E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00009 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.47E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 9.07E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.3 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.64E-05 | mg/kg-day | -- | -- | -- |

Table 7-13.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.53E-06 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.83E-05 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.19E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 2.35E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 5.03E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.005 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.45E-05 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.4 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.86E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.12E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.61E-05 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.2 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.99E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 7.03E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.02 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.72E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.02 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.71E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.2 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.38E-07 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.02 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.52E-04 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.2 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.23E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.03 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 2.62E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.45E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.05 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 5.83E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 2 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 10 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 10 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.98E-05 | µg/m³ | 2.00E-01 | µg/m³ | 0.0001 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 6.07E-05 | µg/m³ | 3.00E+01 | µg/m³ | 0.000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.13E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000004 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.51E-06 | µg/m³ | 1.00E+03 | µg/m³ | 6E-09 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.05E-06 | µg/m³ | 3.00E+00 | µg/m³ | 0.0000007 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.34E-05 | µg/m³ | 1.00E+02 | µg/m³ | 0.0000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.42E-06 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.62E-05 | µg/m³ | 2.00E-03 | µg/m³ | 0.008 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.72E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.74E-07 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.27E-06 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 7.41E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.82E-11 | µg/m³ | 4.00E-05 | µg/m³ | 0.0000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.17E-02 | µg/m³ | 5.00E+00 | µg/m³ | 0.002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.69E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.0002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.87E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.0005 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.42E-05 | µg/m³ | 1.00E-02 | µg/m³ | 0.001 |

Table 7-13.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.75E-05 | µg/m³ | 8.00E-03 | µg/m³ | 0.005 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.62E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0008 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.63E-03 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.01E-02 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.97E-04 | µg/m³ | 5.00E-02 | µg/m³ | 0.008 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 5.54E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.54E-04 | µg/m³ | 9.00E-02 | µg/m³ | 0.004 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.45E-05 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.09E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.50E-05 | µg/m³ | 1.00E-01 | µg/m³ | 0.0002 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-03 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.26E+00 | µg/m³ | 2.00E-01 | µg/m³ | 11 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.52E+00 | µg/m³ | 3.00E+01 | µg/m³ | 0.1 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.63E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.009 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 7.55E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0008 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.34E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.01 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.60E+00 | µg/m³ | 1.00E+02 | µg/m³ | 0.02 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.73E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 4.98E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.0001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.88E-03 | µg/m³ | 3.00E-01 | µg/m³ | 0.03 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 11 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 11 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 12 |
| Medium Total | | | | | | | | | | | -- | | | | | 22 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 7.48E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.44E-02 | mg/kg-day | 4.00E-03 | mg/kg-day | 4 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 3.59E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.004 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 4.03E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.2 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 1.78E-02 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.2 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.77E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.02 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 2.77E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.1 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.09E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.03 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 5.42E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.7 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 4.55E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.09 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 5.91E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.3 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 6.85E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 8.31E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |

Table 7-13.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 7.83E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 6.68E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 6.43E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 2.39E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 1.04E-09 | mg/kg-day | 7.00E-10 | mg/kg-day | 1 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 4.80E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.5 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.1 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 4.02E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 1 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 2.64E-03 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.01 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 2.79E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.1 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 3.36E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.07 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 6.21E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.2 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 3.59E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 1 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 7.31E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 1 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 3.68E-02 | mg/kg-day | 2.40E-02 | mg/kg-day | 2 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 6.48E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.04 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 6.48E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 6 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 5.40E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.1 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 5.23E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 20 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.20E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0005 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.90E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.5 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.85E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0003 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 4.45E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.02 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 9.35E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.09 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.85E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.02 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.59E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.08 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.10E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.64E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.2 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 6.62E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.01 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 3.15E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.2 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 9.38E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0002 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 1.02E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.3 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 3.71E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.04 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 2.11E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.20E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.004 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.77E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 1.16E-05 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0008 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.23E-06 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.09 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.48E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.006 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 5.48E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.07 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 6.32E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |

Table 7-13.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | Value | Units | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 3.22E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.62E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.2 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 2.86E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.003 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 2.86E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.03 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 2.38E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.02 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.38E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 2 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 22 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 22 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 53 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 75 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-14.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.36E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.008 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.03E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.02 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.93E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0005 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 9.37E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00009 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.49E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.28E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.52E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.76E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.09 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.02E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.65E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.56E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.26E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.004 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 3.09E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.04 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.99E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.02 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 9.67E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.2 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.00E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.42E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.37E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.02 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.86E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.78E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.09 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 6.81E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.1 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 6.75E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.03 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 9.41E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.006 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 6.02E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.03 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.46E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.005 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 1.03E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.55E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.005 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.30E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.8 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.25E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.31E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.06E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.19E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.42E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.89E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.13E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.51E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.05 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.40E-06 | mg/kg-day | -- | -- | -- |

Table 7-14.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.55E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.05E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.31E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 3.92E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.39E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0008 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.08E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.07 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.48E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.02E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.69E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.04 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.32E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.17E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.004 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.88E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.85E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.03 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.97E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.54E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.03 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.04E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.005 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 4.37E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0004 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.08E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.008 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 9.72E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 1 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.98E-05 | µg/m³ | 2.00E-01 | µg/m³ | 0.0001 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 6.07E-05 | µg/m³ | 3.00E+01 | µg/m³ | 0.000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.13E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000004 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.51E-06 | µg/m³ | 1.00E+03 | µg/m³ | 6E-09 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.05E-06 | µg/m³ | 3.00E+00 | µg/m³ | 0.0000007 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.34E-05 | µg/m³ | 1.00E+02 | µg/m³ | 0.0000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.42E-06 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.62E-05 | µg/m³ | 2.00E-03 | µg/m³ | 0.008 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.72E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.74E-07 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.27E-06 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 7.41E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.82E-11 | µg/m³ | 4.00E-05 | µg/m³ | 0.0000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.17E-02 | µg/m³ | 5.00E+00 | µg/m³ | 0.002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.69E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.0002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.87E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.0005 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.42E-05 | µg/m³ | 1.00E-02 | µg/m³ | 0.001 |

Table 7-14.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.75E-05 | µg/m³ | 8.00E-03 | µg/m³ | 0.005 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.62E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0008 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.63E-03 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.01E-02 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.97E-04 | µg/m³ | 5.00E-02 | µg/m³ | 0.008 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 5.54E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.54E-04 | µg/m³ | 9.00E-02 | µg/m³ | 0.004 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.45E-05 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.09E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.50E-05 | µg/m³ | 1.00E-01 | µg/m³ | 0.0002 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-03 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.26E+00 | µg/m³ | 2.00E-01 | µg/m³ | 11 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.52E+00 | µg/m³ | 3.00E+01 | µg/m³ | 0.1 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.63E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.009 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 7.55E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0008 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.34E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.01 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.60E+00 | µg/m³ | 1.00E+02 | µg/m³ | 0.02 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.73E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 4.98E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.0001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.88E-03 | µg/m³ | 3.00E-01 | µg/m³ | 0.03 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 11 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 11 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 12 |
| Medium Total | | | | | | | | | | | -- | | | | | 13 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 4.50E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.007 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 8.64E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 2 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.16E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 2.42E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.1 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 1.07E-02 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.1 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.06E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.01 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.66E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.08 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.26E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 3.26E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.4 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 2.74E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.05 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 3.55E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.2 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 4.12E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00008 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 5.00E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.1 |

Table 7-14.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 4.70E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 4.02E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 3.87E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.44E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 6.25E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.9 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 2.88E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.3 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.07 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 2.42E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.8 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 1.59E-03 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.008 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.68E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.08 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 2.02E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.04 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 3.73E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.1 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 2.16E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.7 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 4.40E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.6 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 2.21E-02 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.9 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 3.90E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.02 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 3.90E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 4 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 3.24E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.06 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 3.14E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 12 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.12E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0004 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.30E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.3 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.89E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 2.96E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 6.21E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.06 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.23E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.01 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.05E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.05 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 7.27E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.09E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.1 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 4.40E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.009 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 2.09E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 6.23E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 6.80E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 2.46E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 1.61E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.67E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.003 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.35E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 8.85E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0006 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 9.37E-07 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.07 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.13E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 4.17E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.06 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 4.81E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |

Table 7-14.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 2.45E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.23E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.1 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 2.17E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 2.17E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 1.81E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.01 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.05E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 13 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 13 |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.54E-03 | µg/m³ | 7.00E+00 | µg/m³ | 0.0002 |
| | | | | Benzene | 2.75E+01 | µg/m³ | (2) | -- | -- | -- | -- | 3.62E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Chloroform | 5.77E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.60E-04 | µg/m³ | 9.77E+01 | µg/m³ | 0.000008 |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | (2) | -- | -- | -- | -- | 9.27E-03 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.04E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0004 |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.85E-02 | µg/m³ | 4.00E+02 | µg/m³ | 0.0001 |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | (2) | -- | -- | -- | -- | 4.18E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.01 |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-03 | µg/m³ | 4.00E+01 | µg/m³ | 0.0001 |
| | | | | Toluene | 9.81E+01 | µg/m³ | (2) | -- | -- | -- | -- | 1.29E+00 | µg/m³ | 5.00E+03 | µg/m³ | 0.0003 |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.58E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0005 |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | (2) | -- | -- | -- | -- | 1.34E+00 | µg/m³ | 1.00E+02 | µg/m³ | 0.01 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.43E-04 | µg/m³ | 4.00E-01 | µg/m³ | 0.002 |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.26E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.004 |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | (2) | -- | -- | -- | -- | 7.41E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.41E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.96E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00007 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.0003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |

Table 7-14.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 45 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 57 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-15.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 4.03E-05 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 1.24E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 2.31E-06 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.12E-05 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 4.19E-06 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 2.74E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 4.10E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 1.50E-04 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 4.37E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 2.53E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 3.03E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.51E-07 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 3.71E-11 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 2.39E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 1.16E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 8.40E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.90E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 3.47E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 9.43E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 3.33E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 8.17E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 8.10E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.13E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 7.22E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 2.95E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.24E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 3.06E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.76E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 3.40E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 1.04E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 3.25E-09 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 9.49E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 3.53E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 2.31E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.37E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 5.01E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.46E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |

Table 7-15.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 8.45E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.01E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 4.25E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 3.13E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 6.71E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 3.26E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.18E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 8.16E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 8.91E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.65E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 9.37E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 2.30E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 2.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 3.18E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 2.03E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 8.31E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 3.49E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 8.61E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 7.77E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 6E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 6E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 7.34E-06 | µg/m³ | 1.60E-05 | m³/µg | 1E-10 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 2.25E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.18E-06 | µg/m³ | 4.21E-07 | µg/m³ | 7.80E-06 | m³/µg | 3E-12 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 2.05E-06 | µg/m³ | 2.50E-06 | m³/µg | 5E-12 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 7.62E-07 | µg/m³ | 3.40E-05 | m³/µg | 3E-11 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 4.99E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 4.55E-06 | µg/m³ | 6.00E-05 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 1.67E-05 | µg/m³ | 6.00E-04 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 4.85E-06 | µg/m³ | 6.00E-05 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.82E-07 | µg/m³ | 6.00E-04 | m³/µg | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 3.36E-06 | µg/m³ | 6.00E-05 | m³/µg | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 2.75E-08 | µg/m³ | 6.90E-05 | m³/µg | 2E-12 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 6.76E-12 | µg/m³ | 3.80E+01 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 4.35E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 5.93E-05 | µg/m³ | 2.11E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 2.55E-06 | µg/m³ | 4.30E-03 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 5.28E-06 | µg/m³ | 1.80E-03 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |

Table 7-15.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 3.86E-05 | µg/m³ | 1.20E-02 | m³/µg | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 1.72E-06 | µg/m³ | 9.00E-03 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Copper | 1.70E-03 | µg/m³ | 6.07E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 1.49E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 1.48E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 5.77E-07 | µg/m³ | 2.06E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 3.69E-04 | µg/m³ | 1.32E-04 | µg/m³ | 2.60E-04 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Silver | 1.51E-05 | µg/m³ | 5.38E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 2.26E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 5.57E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.41E-03 | µg/m³ | 5.03E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 5E-07 | | | | | -- |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | 8.40E-01 | µg/m³ | 1.60E-05 | m³/µg | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | 1.31E+00 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.74E-01 | µg/m³ | 9.76E-02 | µg/m³ | 7.80E-06 | m³/µg | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | 2.80E-01 | µg/m³ | 2.50E-06 | m³/µg | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | 1.24E-02 | µg/m³ | 3.40E-05 | m³/µg | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | 5.95E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | 3.84E-04 | µg/m³ | 6.00E-05 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | 1.85E-09 | µg/m³ | 3.80E+01 | m³/µg | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | 3.67E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 2E-05 | | | | | -- |
| Medium Total | | | | | | | | | | | 6E-04 | | | | | -- |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 1.93E-05 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 3.70E-03 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 9.24E-06 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.04E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 4.58E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 4.55E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 7.13E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 9E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 5.39E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 1.40E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.68E-05 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 1.52E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.76E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.14E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-15.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 6.27E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 5.35E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 5.15E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 6.16E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 2.68E-10 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.24E-01 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 1.04E-04 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 6.79E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 7.19E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 8.64E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 4.97E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 9.23E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 1.88E-01 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 9.47E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 1.67E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.67E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 1.39E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 1.35E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 8E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 8.95E-07 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 5.33E-04 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 7.96E-07 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.25E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 2.62E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 5.17E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 4.44E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 3.06E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 4.59E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 2.66E-06 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 8.82E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 2.63E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.87E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 1.04E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 6.60E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 6.85E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 5.53E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 3.63E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 3.84E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 4.61E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 5.36E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 1.97E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-15.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Iron | 1.47E+01 | mg/L | 1.01E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 5.06E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 8.91E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 8.91E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 7.42E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 4.31E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-03 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-03 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | 4.41E-04 | µg/m³ | 2.60E-05 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.75E+01 | µg/m³ | 1.03E-01 | µg/m³ | 7.80E-06 | m³/µg | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 5.77E-02 | µg/m³ | 2.17E-04 | µg/m³ | 2.30E-05 | m³/µg | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | 2.65E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | 1.15E-01 | µg/m³ | 2.50E-06 | m³/µg | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | 1.10E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | 1.19E-02 | µg/m³ | 3.40E-05 | m³/µg | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | 1.16E-03 | µg/m³ | 2.60E-07 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 9.81E+01 | µg/m³ | 3.69E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | 3.71E-02 | µg/m³ | 4.10E-06 | m³/µg | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | 3.82E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | 2.41E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | 3.60E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | 5.55E-04 | µg/m³ | 6.00E-05 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | 6.89E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | 8.46E-10 | µg/m³ | 3.80E+01 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | 2.90E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-06 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 3.02E-01 | µg/m³ | 2.60E-05 | m³/µg | 8E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 4.76E+02 | µg/m³ | 1.70E+02 | µg/m³ | 7.80E-06 | m³/µg | 1E-03 | (2) | -- | -- | -- | -- |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 1.07E+03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 1.49E+02 | µg/m³ | 2.50E-06 | m³/µg | 4E-04 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 1.52E+01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 7.69E-01 | µg/m³ | 3.40E-05 | m³/µg | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 3.60E+00 | µg/m³ | 2.60E-07 | m³/µg | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 2.66E+03 | µg/m³ | 9.47E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 7.39E-01 | µg/m³ | 4.10E-06 | m³/µg | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 4.63E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 2.47E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-15.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 3.78E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-03 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-03 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 2E-03 | | | | | -- |
| Medium Total | | | | | | | | | | | 3E-03 | | | | | -- |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 3E-03 | | | | Total of Receptor Hazards Across All Media | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-16.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 3.52E-03 | mg/kg-day | -- | -- | -- | 9.86E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 4.58E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | 1.28E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.26E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-06 | 9.14E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.04E-06 | mg/kg-day | -- | -- | -- | 2.92E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Iron | 8.70E+03 | mg/kg | 2.66E-03 | mg/kg-day | -- | -- | -- | 7.45E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.33E-08 | mg/kg-day | -- | -- | -- | 9.33E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.009 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.05 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.49E-04 | mg/kg-day | -- | -- | -- | 4.17E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0004 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 9.69E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 2.71E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.38E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-06 | 3.87E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 4.41E-08 | mg/kg-day | -- | -- | -- | 1.24E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.13E-04 | mg/kg-day | -- | -- | -- | 3.15E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0005 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.41E-09 | mg/kg-day | -- | -- | -- | 3.95E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 0.008 |
| | | Exp. Point Total | | | | | | | | | 5E-06 | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | 5E-06 | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 6.91E-04 | µg/m³ | -- | -- | -- | 1.93E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0004 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 1.50E-07 | µg/m³ | 4.30E-03 | m³/µg | 6E-10 | 4.19E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00003 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 6.40E-07 | µg/m³ | 1.20E-02 | m³/µg | 8E-09 | 1.79E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 2.05E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | 5.73E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.0001 |
| | | | | Iron | 6.40E-03 | µg/m³ | 5.22E-04 | µg/m³ | -- | -- | -- | 1.46E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 6.54E-09 | µg/m³ | -- | -- | -- | 1.83E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | 1E-08 | | | | | 0.0007 |
| | Exp. Medium Total | | | | | | | | | | 1E-08 | | | | | 0.0007 |
| Medium Total | | | | | | | | | | | 5E-06 | | | | | 0.06 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.42E-06 | µg/m³ | 2.60E-05 | m³/µg | 4E-11 | 3.96E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000006 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 5.37E-04 | µg/m³ | 7.80E-06 | m³/µg | 4E-09 | 1.50E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00005 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 1.08E-06 | µg/m³ | 2.30E-05 | m³/µg | 2E-11 | 3.01E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000003 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.37E-05 | µg/m³ | -- | -- | -- | 3.83E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 6.00E-04 | µg/m³ | 2.50E-06 | m³/µg | 1E-09 | 1.68E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000002 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 6.19E-05 | µg/m³ | -- | -- | -- | 1.73E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000004 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 2.56E-05 | µg/m³ | 3.40E-05 | m³/µg | 9E-10 | 7.17E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 1.04E-05 | µg/m³ | 2.60E-07 | m³/µg | 3E-12 | 2.92E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000007 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 1.91E-03 | µg/m³ | -- | -- | -- | 5.33E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.000001 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 2.04E-06 | µg/m³ | 4.10E-06 | m³/µg | 8E-12 | 5.71E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000003 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 1.60E-03 | µg/m³ | -- | -- | -- | 4.49E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-16.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 3.87E-07 | µg/m³ | -- | -- | -- | 1.08E-06 | µg/m³ | 4.00E-01 | µg/m³ | 0.000003 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 6.50E-06 | µg/m³ | -- | -- | -- | 1.82E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000006 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 3.70E-10 | µg/m³ | 6.00E-05 | m³/µg | 2E-14 | 1.03E-09 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 7.35E-08 | µg/m³ | -- | -- | -- | 2.06E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 8.05E-13 | µg/m³ | 3.80E+01 | m³/µg | 3E-11 | 2.25E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 1.08E-07 | µg/m³ | -- | -- | -- | 3.03E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000001 |
| | | | Exp. Route Total | | | | | | | | 7E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 7E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 7E-09 | | | | | 0.0001 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 6.92E-02 | µg/m³ | 2.60E-05 | m³/µg | 2E-06 | 1.94E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.03 |
| | | | | Benzene | 4.76E+02 | µg/m³ | 3.88E+01 | µg/m³ | 7.80E-06 | m³/µg | 3E-04 | 1.09E+02 | µg/m³ | 3.00E+01 | µg/m³ | 4 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 2.45E+02 | µg/m³ | -- | -- | -- | 6.85E+02 | µg/m³ | 6.00E+03 | µg/m³ | 0.1 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 3.42E+01 | µg/m³ | 2.50E-06 | m³/µg | 9E-05 | 9.57E+01 | µg/m³ | 1.00E+03 | µg/m³ | 0.1 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 3.49E+00 | µg/m³ | -- | -- | -- | 9.77E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.02 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 1.76E-01 | µg/m³ | 3.40E-05 | m³/µg | 6E-06 | 4.93E-01 | µg/m³ | 3.00E+00 | µg/m³ | 0.2 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 8.24E-01 | µg/m³ | 2.60E-07 | m³/µg | 2E-07 | 2.31E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.06 |
| | | | | Toluene | 2.66E+03 | µg/m³ | 2.17E+02 | µg/m³ | -- | -- | -- | 6.07E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.1 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 1.18E-01 | µg/m³ | 4.10E-06 | m³/µg | 5E-07 | 3.31E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.2 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 1.06E+02 | µg/m³ | -- | -- | -- | 2.97E+02 | µg/m³ | 1.00E+02 | µg/m³ | 3 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 5.65E-03 | µg/m³ | -- | -- | -- | 1.58E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.04 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 8.64E-03 | µg/m³ | -- | -- | -- | 2.42E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.08 |
| | | | Exp. Route Total | | | | | | | | 4E-04 | | | | | 7 |
| | | Exp. Point Total | | | | | | | | | 4E-04 | | | | | 7 |
| | Exp. Medium Total | | | | | | | | | | 4E-04 | | | | | 7 |
| Medium Total | | | | | | | | | | | 4E-04 | | | | | 7 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 8 |

Notes:
Total of Receptor Hazards Across All Media

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-17.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 4.65E-04 | mg/kg-day | -- | -- | -- | 3.25E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.03 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 6.04E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 9E-08 | 4.23E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0008 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 4.31E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-07 | 3.01E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.006 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.38E-07 | mg/kg-day | -- | -- | -- | 9.64E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Iron | 8.70E+03 | mg/kg | 3.51E-04 | mg/kg-day | -- | -- | -- | 2.46E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.04 |
| | | | | Thallium | 1.09E-01 | mg/kg | 4.40E-09 | mg/kg-day | -- | -- | -- | 3.08E-07 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.008 |
| | | | Exp. Route Total | | | | | | | | 3E-07 | | | | | 0.09 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.49E-05 | mg/kg-day | -- | -- | -- | 1.04E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 9.69E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 6.78E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.38E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-07 | 9.67E-07 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.008 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 4.41E-09 | mg/kg-day | -- | -- | -- | 3.09E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0001 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.13E-05 | mg/kg-day | -- | -- | -- | 7.88E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.41E-10 | mg/kg-day | -- | -- | -- | 9.87E-09 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | 3E-07 | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | 6E-07 | | | | | 0.1 |
| | Exp. Medium Total | | | | | | | | | | 6E-07 | | | | | 0.1 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.08E+00 | µg/m³ | 3.54E-03 | µg/m³ | -- | -- | -- | 2.48E-01 | µg/m³ | 5.00E+00 | µg/m³ | 0.05 |
| | | | | Arsenic | 2.35E-04 | µg/m³ | 7.66E-07 | µg/m³ | 4.30E-03 | m³/µg | 3E-09 | 5.36E-05 | µg/m³ | 1.50E-02 | µg/m³ | 0.004 |
| | | | | Chromium, Total | 1.00E-03 | µg/m³ | 3.28E-06 | µg/m³ | 1.20E-02 | m³/µg | 4E-08 | 2.29E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.0008 |
| | | | | Cobalt | 3.21E-04 | µg/m³ | 1.05E-06 | µg/m³ | 9.00E-03 | m³/µg | 9E-09 | 7.33E-05 | µg/m³ | 2.00E-02 | µg/m³ | 0.004 |
| | | | | Iron | 8.19E-01 | µg/m³ | 2.67E-03 | µg/m³ | -- | -- | -- | 1.87E-01 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 1.03E-05 | µg/m³ | 3.35E-08 | µg/m³ | -- | -- | -- | 2.34E-06 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-08 | | | | | 0.06 |
| | | Exp. Point Total | | | | | | | | | 5E-08 | | | | | 0.06 |
| | Exp. Medium Total | | | | | | | | | | 5E-08 | | | | | 0.06 |
| Medium Total | | | | | | | | | | | 6E-07 | | | | | 0.2 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 1.93E-09 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 2E-10 | 1.35E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000007 |
| | | | | Benzene | 2.88E-01 | mg/L | 3.70E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-08 | 2.59E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.003 |
| | | | | Chloroform | 7.20E-04 | mg/L | 9.25E-10 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 3E-11 | 6.47E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000006 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.04E-08 | mg/kg-day | -- | -- | -- | 7.27E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00004 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 4.58E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 5E-09 | 3.21E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0006 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 4.55E-08 | mg/kg-day | -- | -- | -- | 3.18E-06 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.000008 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 7.14E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 9E-09 | 4.99E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000008 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 5.39E-09 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 1E-11 | 3.78E-07 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00005 |
| | | | | Toluene | 1.09E+00 | mg/L | 1.40E-06 | mg/kg-day | -- | -- | -- | 9.77E-05 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.0001 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.17E-09 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 5E-11 | 8.21E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0002 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 1.52E-06 | mg/kg-day | -- | -- | -- | 1.07E-04 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-17.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.76E-09 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 1E-11 | 1.24E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.14E-08 | mg/kg-day | -- | -- | -- | 1.50E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0004 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 2.02E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-11 | 1.41E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 1.72E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-10 | 1.20E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00004 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 1.66E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-11 | 1.16E-08 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 6.16E-10 | mg/kg-day | -- | -- | -- | 4.32E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 2.68E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-09 | 1.87E-12 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.00009 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.24E-05 | mg/kg-day | -- | -- | -- | 8.65E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0009 |
| | | | | Antimony | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | -- | -- | -- | 8.99E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.0002 |
| | | | | Arsenic | 8.07E-03 | mg/L | 1.04E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-08 | 7.25E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Barium | 5.29E-02 | mg/L | 6.79E-08 | mg/kg-day | -- | -- | -- | 4.76E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | Beryllium | 5.60E-03 | mg/L | 7.19E-09 | mg/kg-day | -- | -- | -- | 5.03E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 8.64E-10 | mg/kg-day | -- | -- | -- | 6.05E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 1.60E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 8E-09 | 1.12E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0002 |
| | | | | Cobalt | 7.19E-03 | mg/L | 9.24E-09 | mg/kg-day | -- | -- | -- | 6.47E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0002 |
| | | | | Iron | 1.47E+01 | mg/L | 1.88E-05 | mg/kg-day | -- | -- | -- | 1.32E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Manganese | 7.38E-01 | mg/L | 9.47E-07 | mg/kg-day | -- | -- | -- | 6.63E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.003 |
| | | | | Mercury | 1.30E-04 | mg/L | 1.67E-10 | mg/kg-day | -- | -- | -- | 1.17E-08 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.67E-09 | mg/kg-day | -- | -- | -- | 1.17E-07 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.003 |
| | | | | Vanadium | 1.08E-02 | mg/L | 1.39E-08 | mg/kg-day | -- | -- | -- | 9.73E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | Zinc | 1.05E-01 | mg/L | 1.35E-07 | mg/kg-day | -- | -- | -- | 9.42E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00003 |
| | | | Exp. Route Total | | | | | | | | 6E-08 | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 6.39E-09 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 6E-10 | 4.48E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Benzene | 2.88E-01 | mg/L | 4.09E-06 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-07 | 2.86E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.03 |
| | | | | Chloroform | 7.20E-04 | mg/L | 5.19E-09 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-10 | 3.64E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000004 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 8.83E-08 | mg/kg-day | -- | -- | -- | 6.18E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0003 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 1.64E-05 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-07 | 1.15E-03 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.02 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 2.90E-06 | mg/kg-day | -- | -- | -- | 2.03E-04 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0005 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 2.59E-06 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 3E-07 | 1.81E-04 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0003 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 1.67E-07 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 3E-10 | 1.17E-05 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.001 |
| | | | | Toluene | 1.09E+00 | mg/L | 3.18E-05 | mg/kg-day | -- | -- | -- | 2.22E-03 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.003 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.14E-08 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 5E-10 | 8.01E-07 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.002 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 5.53E-05 | mg/kg-day | -- | -- | -- | 3.87E-03 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.01 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.37E-07 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 1E-09 | 9.62E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 1.53E-06 | mg/kg-day | -- | -- | -- | 1.07E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.03 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 5.38E-08 | mg/kg-day | -- | -- | -- | 3.77E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0009 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 8.30E-06 | mg/kg-day | -- | -- | -- | 5.81E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Antimony | 1.00E-03 | mg/L | 8.63E-10 | mg/kg-day | -- | -- | -- | 6.04E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.001 |
| | | | | Arsenic | 8.07E-03 | mg/L | 6.96E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 4.87E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Barium | 5.29E-02 | mg/L | 4.56E-08 | mg/kg-day | -- | -- | -- | 3.20E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0002 |
| | | | | Beryllium | 5.60E-03 | mg/L | 4.83E-09 | mg/kg-day | -- | -- | -- | 3.38E-07 | mg/kg-day | 3.50E-05 | mg/kg-day | 0.01 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 5.81E-10 | mg/kg-day | -- | -- | -- | 4.06E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.002 |

Table 7-17.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 2.15E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 4E-07 | 1.51E-06 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.01 |
| | | | | Cobalt | 7.19E-03 | mg/L | 2.48E-09 | mg/kg-day | -- | -- | -- | 1.74E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00006 |
| | | | | Iron | 1.47E+01 | mg/L | 1.27E-05 | mg/kg-day | -- | -- | -- | 8.86E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Manganese | 7.38E-01 | mg/L | 6.36E-07 | mg/kg-day | -- | -- | -- | 4.45E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.05 |
| | | | | Mercury | 1.30E-04 | mg/L | 1.12E-10 | mg/kg-day | -- | -- | -- | 7.85E-09 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.12E-09 | mg/kg-day | -- | -- | -- | 7.85E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.002 |
| | | | | Vanadium | 1.08E-02 | mg/L | 9.34E-09 | mg/kg-day | -- | -- | -- | 6.53E-07 | mg/kg-day | 2.60E-04 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.05E-01 | mg/L | 5.43E-08 | mg/kg-day | -- | -- | -- | 3.80E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00001 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.2 |
| | | Exp. Point Total | | | | | | | | | 1E-06 | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | 1E-06 | | | | | 0.2 |
| | Outdoor Air | Trench (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.19E+01 | µg/m³ | 9.69E-03 | µg/m³ | 2.60E-05 | m³/µg | 3E-07 | 6.78E-01 | µg/m³ | 7.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.69E+03 | µg/m³ | 2.20E+00 | µg/m³ | 7.80E-06 | m³/µg | 2E-05 | 1.54E+02 | µg/m³ | 8.00E+01 | µg/m³ | 2 |
| | | | | Chloroform | 5.42E+00 | µg/m³ | 4.42E-03 | µg/m³ | 2.30E-05 | m³/µg | 1E-07 | 3.09E-01 | µg/m³ | 2.44E+02 | µg/m³ | 0.001 |
| | | | | cis-1,2-Dichloroethene | 6.76E+01 | µg/m³ | 5.51E-02 | µg/m³ | -- | -- | -- | 3.86E+00 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 2.87E+03 | µg/m³ | 2.34E+00 | µg/m³ | 2.50E-06 | m³/µg | 6E-06 | 1.64E+02 | µg/m³ | 9.00E+03 | µg/m³ | 0.02 |
| | | | | Isopropylbenzene | 2.70E+02 | µg/m³ | 2.20E-01 | µg/m³ | -- | -- | -- | 1.54E+01 | µg/m³ | 9.00E+01 | µg/m³ | 0.2 |
| | | | | Naphthalene | 3.67E+02 | µg/m³ | 2.99E-01 | µg/m³ | 3.40E-05 | m³/µg | 1E-05 | 2.09E+01 | µg/m³ | 3.00E+00 | µg/m³ | 7 |
| | | | | Tetrachloroethene | 2.72E+01 | µg/m³ | 2.21E-02 | µg/m³ | 2.60E-07 | m³/µg | 6E-09 | 1.55E+00 | µg/m³ | 4.07E+01 | µg/m³ | 0.04 |
| | | | | Toluene | 9.37E+03 | µg/m³ | 7.64E+00 | µg/m³ | -- | -- | -- | 5.35E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.1 |
| | | | | Trichloroethene | 6.62E+00 | µg/m³ | 5.39E-03 | µg/m³ | 4.10E-06 | m³/µg | 2E-08 | 3.78E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.2 |
| | | | | Xylenes, Total | 9.51E+03 | µg/m³ | 7.75E+00 | µg/m³ | -- | -- | -- | 5.43E+02 | µg/m³ | 4.00E+02 | µg/m³ | 1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 7.81E+00 | µg/m³ | 6.37E-03 | µg/m³ | -- | -- | -- | 4.46E-01 | µg/m³ | 4.00E+00 | µg/m³ | 0.1 |
| | | | | 2-Methylnaphthalene | 1.05E+02 | µg/m³ | 8.60E-02 | µg/m³ | -- | -- | -- | 6.02E+00 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.31E-02 | µg/m³ | 4.33E-05 | µg/m³ | 6.00E-05 | m³/µg | 3E-09 | 3.03E-03 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 5.84E-01 | µg/m³ | 4.76E-04 | µg/m³ | -- | -- | -- | 3.33E-02 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 6.01E-05 | µg/m³ | 4.90E-08 | µg/m³ | 3.80E+01 | m³/µg | 2E-06 | 3.43E-06 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.63E-01 | µg/m³ | 6.22E-04 | µg/m³ | -- | -- | -- | 4.36E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.1 |
| | | | Exp. Route Total | | | | | | | | 4E-05 | | | | | 11 |
| | | Exp. Point Total | | | | | | | | | 4E-05 | | | | | 11 |
| | Exp. Medium Total | | | | | | | | | | 4E-05 | | | | | 11 |
| Medium Total | | | | | | | | | | | 4E-05 | | | | | 11 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-18.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.47E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.1 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.91E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.06 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.36E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.05 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.36E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.1 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.11E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.2 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.39E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.1 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.7 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.49E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.003 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.27E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.24E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.04 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.03E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.64E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.31E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.06 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.8 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.8 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 8.12E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.002 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.76E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.0001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.53E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0009 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.41E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0004 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.14E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 7.69E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.8 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 7.48E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.44E-02 | mg/kg-day | 4.00E-03 | mg/kg-day | 4 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 3.59E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.004 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 4.03E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.2 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 1.78E-02 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.2 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.77E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.02 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 2.77E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.1 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.09E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.03 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 5.42E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.7 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 4.55E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.09 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 5.91E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.3 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-18.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 6.85E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 8.31E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 7.83E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 6.68E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 6.43E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 2.39E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 1.04E-09 | mg/kg-day | 7.00E-10 | mg/kg-day | 1 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 4.80E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.5 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.1 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 4.02E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 1 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 2.64E-03 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.01 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 2.79E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.1 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 3.36E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.07 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 6.21E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.2 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 3.59E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 1 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 7.31E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 1 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 3.68E-02 | mg/kg-day | 2.40E-02 | mg/kg-day | 2 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 6.48E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.04 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 6.48E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 6 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 5.40E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.1 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 5.23E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 20 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.20E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0005 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.90E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.5 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.85E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0003 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 4.45E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.02 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 9.35E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.09 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.85E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.02 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.59E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.08 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.10E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.64E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.2 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 6.62E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.01 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 3.15E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.2 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 9.38E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0002 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 1.02E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.3 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 3.71E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.04 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 2.11E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.20E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.004 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.77E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 1.16E-05 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0008 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.23E-06 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.09 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.48E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.006 |

Table 7-18.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 5.48E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.07 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 6.32E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 3.22E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.62E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.2 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 2.86E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.003 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 2.86E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.03 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 2.38E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.02 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.38E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 2 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 22 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 22 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 53 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 54 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-19.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | Value | Units | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.38E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.79E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.28E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.004 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.09E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.04E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.31E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.07 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 5.83E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.79E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.40E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.007 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.73E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 4.40E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0006 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.52E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.08 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.08 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 8.12E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.002 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.76E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.0001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.53E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0009 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.41E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0004 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.14E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 7.69E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.08 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 4.50E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.007 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 8.64E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 2 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.16E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 2.42E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.1 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 1.07E-02 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.1 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.06E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.01 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.66E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.08 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.26E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 3.26E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.4 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 2.74E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.05 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 3.55E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.2 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-19.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 4.12E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00008 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 5.00E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.1 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 4.70E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 4.02E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 3.87E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.44E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 6.25E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.9 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 2.88E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.3 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.07 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 2.42E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.8 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 1.59E-03 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.008 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.68E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.08 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 2.02E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.04 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 3.73E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.1 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 2.16E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.7 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 4.40E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.6 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 2.21E-02 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.9 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 3.90E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.02 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 3.90E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 4 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 3.24E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.06 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 3.14E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 12 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.12E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0004 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.30E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.3 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.89E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 2.96E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 6.21E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.06 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.23E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.01 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.05E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.05 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 7.27E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.09E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.1 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 4.40E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.009 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 2.09E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 6.23E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0001 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 6.80E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 2.46E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 1.61E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.67E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.003 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.35E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 8.85E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0006 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 9.37E-07 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.07 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.13E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |

Table 7-19.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 4.17E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.06 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 4.81E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 2.45E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.23E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.1 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 2.17E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 2.17E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 1.81E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.01 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.05E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 13 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 13 |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.54E-03 | µg/m³ | 7.00E+00 | µg/m³ | 0.0002 |
| | | | | Benzene | 2.75E+01 | µg/m³ | (2) | -- | -- | -- | -- | 3.62E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Chloroform | 5.77E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.60E-04 | µg/m³ | 9.77E+01 | µg/m³ | 0.000008 |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | (2) | -- | -- | -- | -- | 9.27E-03 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.04E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0004 |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.85E-02 | µg/m³ | 4.00E+02 | µg/m³ | 0.0001 |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | (2) | -- | -- | -- | -- | 4.18E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.01 |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-03 | µg/m³ | 4.00E+01 | µg/m³ | 0.0001 |
| | | | | Toluene | 9.81E+01 | µg/m³ | (2) | -- | -- | -- | -- | 1.29E+00 | µg/m³ | 5.00E+03 | µg/m³ | 0.0003 |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.58E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0005 |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | (2) | -- | -- | -- | -- | 1.34E+00 | µg/m³ | 1.00E+02 | µg/m³ | 0.01 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.43E-04 | µg/m³ | 4.00E-01 | µg/m³ | 0.002 |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.26E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.004 |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | (2) | -- | -- | -- | -- | 7.41E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.41E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.96E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00007 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.0003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |

Table 7-19.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 45 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 45 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-20.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.66E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 2.15E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 6.97E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 4.91E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 1.25E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.57E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 4.66E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 3.03E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.79E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 4E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.38E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 3.52E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 4.41E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 3.02E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 6.54E-07 | µg/m³ | 4.30E-03 | m³/µg | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 7.74E-06 | µg/m³ | 1.20E-02 | m³/µg | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 8.94E-07 | µg/m³ | 9.00E-03 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Iron | 6.40E-03 | µg/m³ | 2.28E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 2.86E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-07 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-07 | | | | | -- |
| Medium Total | | | | | | | | | | | 7E-05 | | | | | -- |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 1.93E-05 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 3.70E-03 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 9.24E-06 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.04E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 4.58E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 4.55E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 7.13E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 9E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 5.39E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 1.40E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.68E-05 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 1.52E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-20.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.76E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.14E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 6.27E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 5.35E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 5.15E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 6.16E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 2.68E-10 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.24E-01 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 1.04E-04 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 6.79E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 7.19E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 8.64E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 4.97E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 9.23E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 1.88E-01 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 9.47E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 1.67E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.67E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 1.39E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 1.35E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 8E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 8.95E-07 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 5.33E-04 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 7.96E-07 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.25E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 2.62E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 5.17E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 4.44E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 3.06E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 4.59E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 2.66E-06 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 8.82E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 2.63E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.87E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 1.04E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 6.60E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 6.85E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 5.53E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 3.63E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 3.84E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 4.61E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-20.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 5.36E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 1.97E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 1.01E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 5.06E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 8.91E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 8.91E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 7.42E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 4.31E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-03 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-03 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | 4.41E-04 | µg/m³ | 2.60E-05 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.75E+01 | µg/m³ | 1.03E-01 | µg/m³ | 7.80E-06 | m³/µg | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 5.77E-02 | µg/m³ | 2.17E-04 | µg/m³ | 2.30E-05 | m³/µg | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | 2.65E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | 1.15E-01 | µg/m³ | 2.50E-06 | m³/µg | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | 1.10E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | 1.19E-02 | µg/m³ | 3.40E-05 | m³/µg | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | 1.16E-03 | µg/m³ | 2.60E-07 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 9.81E+01 | µg/m³ | 3.69E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | 3.71E-02 | µg/m³ | 4.10E-06 | m³/µg | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | 3.82E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | 2.41E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | 3.60E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | 5.55E-04 | µg/m³ | 6.00E-05 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | 6.89E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | 8.46E-10 | µg/m³ | 3.80E+01 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | 2.90E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-06 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 3.02E-01 | µg/m³ | 2.60E-05 | m³/µg | 8E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 4.76E+02 | µg/m³ | 1.70E+02 | µg/m³ | 7.80E-06 | m³/µg | 1E-03 | (2) | -- | -- | -- | -- |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 1.07E+03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 1.49E+02 | µg/m³ | 2.50E-06 | m³/µg | 4E-04 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 1.52E+01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 7.69E-01 | µg/m³ | 3.40E-05 | m³/µg | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 3.60E+00 | µg/m³ | 2.60E-07 | m³/µg | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 2.66E+03 | µg/m³ | 9.47E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 7.39E-01 | µg/m³ | 4.10E-06 | m³/µg | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 4.63E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-20.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 2.47E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 3.78E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-03 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-03 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 2E-03 | | | | | -- |
| Medium Total | | | | | | | | | | | 3E-03 | | | | | -- |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-21.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 7.71E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 4E-07 | 2.16E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.005 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.37E-05 | mg/kg-day | -- | -- | -- | 6.63E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Benzene | 1.61E+00 | mg/kg | 4.42E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-08 | 1.24E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.15E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-08 | 6.02E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00006 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 8.01E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-07 | 2.24E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 5.24E-06 | mg/kg-day | -- | -- | -- | 1.47E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00007 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.73E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | 4.83E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 6.33E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 6E-06 | 1.77E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.06 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.84E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | 5.15E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.07E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-07 | 2.99E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.28E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | 3.57E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 2.89E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 7E-09 | 8.09E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 7.10E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 9E-07 | 1.99E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 4.56E-03 | mg/kg-day | -- | -- | -- | 1.28E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Antimony | 8.07E+01 | mg/kg | 2.22E-05 | mg/kg-day | -- | -- | -- | 6.22E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.2 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.61E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-06 | 4.50E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 5.55E-06 | mg/kg-day | -- | -- | -- | 1.55E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.46E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 7E-06 | 4.09E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.01 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 1.80E-06 | mg/kg-day | -- | -- | -- | 5.05E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Copper | 2.32E+03 | mg/kg | 6.37E-04 | mg/kg-day | -- | -- | -- | 1.78E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.05 |
| | | | | Iron | 5.68E+04 | mg/kg | 1.56E-02 | mg/kg-day | -- | -- | -- | 4.38E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.06 |
| | | | | Manganese | 5.63E+02 | mg/kg | 1.55E-04 | mg/kg-day | -- | -- | -- | 4.34E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.02 |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.16E-07 | mg/kg-day | -- | -- | -- | 6.05E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.38E-04 | mg/kg-day | -- | -- | -- | 3.87E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 2.05E+01 | mg/kg | 5.65E-06 | mg/kg-day | -- | -- | -- | 1.58E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Thallium | 8.63E-02 | mg/kg | 2.37E-08 | mg/kg-day | -- | -- | -- | 6.65E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 5.85E-06 | mg/kg-day | -- | -- | -- | 1.64E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.92E+03 | mg/kg | 5.29E-04 | mg/kg-day | -- | -- | -- | 1.48E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | 0.5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 9.78E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 6E-08 | 2.74E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0007 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.01E-06 | mg/kg-day | -- | -- | -- | 8.41E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Benzene | 1.61E+00 | mg/kg | 9.35E-10 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 5E-11 | 2.62E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0000007 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.73E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-09 | 7.65E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000008 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.02E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-08 | 2.85E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 6.65E-07 | mg/kg-day | -- | -- | -- | 1.86E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000009 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 9.50E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-08 | 2.66E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 3.48E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-06 | 9.75E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.01E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | 2.84E-06 | mg/kg-day | -- | -- | -- |

Table 7-21.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 5.87E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 6E-08 | 1.64E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 7.02E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 7E-08 | 1.97E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.22E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-09 | 3.42E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 9.02E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 2.52E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.93E-04 | mg/kg-day | -- | -- | -- | 5.41E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0005 |
| | | | | Antimony | 8.07E+01 | mg/kg | 9.40E-07 | mg/kg-day | -- | -- | -- | 2.63E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.04 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 3.40E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-07 | 9.53E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.35E-08 | mg/kg-day | -- | -- | -- | 6.57E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.003 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 6.19E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-05 | 1.73E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.02 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 7.63E-08 | mg/kg-day | -- | -- | -- | 2.14E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Copper | 2.32E+03 | mg/kg | 2.70E-05 | mg/kg-day | -- | -- | -- | 7.55E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.002 |
| | | | | Iron | 5.68E+04 | mg/kg | 6.62E-04 | mg/kg-day | -- | -- | -- | 1.85E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.003 |
| | | | | Manganese | 5.63E+02 | mg/kg | 6.56E-06 | mg/kg-day | -- | -- | -- | 1.84E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.02 |
| | | | | Mercury | 7.85E-01 | mg/kg | 9.14E-09 | mg/kg-day | -- | -- | -- | 2.56E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.002 |
| | | | | Nickel | 5.02E+02 | mg/kg | 5.85E-06 | mg/kg-day | -- | -- | -- | 1.64E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.02 |
| | | | | Silver | 2.05E+01 | mg/kg | 2.39E-07 | mg/kg-day | -- | -- | -- | 6.70E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.003 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.01E-09 | mg/kg-day | -- | -- | -- | 2.81E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.48E-07 | mg/kg-day | -- | -- | -- | 6.94E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.005 |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.24E-05 | mg/kg-day | -- | -- | -- | 6.26E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | 0.2 |
| | | Exp. Point Total | | | | | | | | | 4E-05 | | | | | 0.7 |
| | Exp. Medium Total | | | | | | | | | | 4E-05 | | | | | 0.7 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 1.51E-06 | µg/m³ | 1.60E-05 | m³/µg | 2E-11 | 4.23E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00002 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 4.64E-06 | µg/m³ | -- | -- | -- | 1.30E-05 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000004 |
| | | | | Benzene | 1.18E-06 | µg/m³ | 8.67E-08 | µg/m³ | 7.80E-06 | m³/µg | 7E-13 | 2.43E-07 | µg/m³ | 3.00E+01 | µg/m³ | 8E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 4.22E-07 | µg/m³ | 2.50E-06 | m³/µg | 1E-12 | 1.18E-06 | µg/m³ | 1.00E+03 | µg/m³ | 1E-09 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 1.57E-07 | µg/m³ | 3.40E-05 | m³/µg | 5E-12 | 4.40E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.0000001 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 1.03E-06 | µg/m³ | -- | -- | -- | 2.88E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 3.39E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 9.48E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 1.24E-06 | µg/m³ | 6.00E-04 | m³/µg | 7E-10 | 3.48E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.002 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 3.61E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 1.01E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.09E-08 | µg/m³ | 6.00E-04 | m³/µg | 1E-11 | 5.87E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 2.50E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 7.01E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 5.67E-09 | µg/m³ | 6.90E-05 | m³/µg | 4E-13 | 1.59E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.39E-12 | µg/m³ | 3.80E+01 | m³/µg | 5E-11 | 3.90E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.0000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 8.95E-04 | µg/m³ | -- | -- | -- | 2.51E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0005 |
| | | | | Antimony | 5.93E-05 | µg/m³ | 4.36E-06 | µg/m³ | -- | -- | -- | 1.22E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.00004 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 5.26E-07 | µg/m³ | 4.30E-03 | m³/µg | 2E-09 | 1.47E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.0001 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 1.09E-06 | µg/m³ | 1.80E-03 | m³/µg | 2E-09 | 3.05E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0003 |

Table 7-21.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 2.87E-06 | µg/m³ | 1.20E-02 | m³/µg | 3E-08 | 8.03E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.001 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 3.54E-07 | µg/m³ | 9.00E-03 | m³/µg | 3E-09 | 9.91E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.0002 |
| | | | | Copper | 1.70E-03 | µg/m³ | 1.25E-04 | µg/m³ | -- | -- | -- | 3.50E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 3.07E-03 | µg/m³ | -- | -- | -- | 8.59E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 3.04E-05 | µg/m³ | -- | -- | -- | 8.51E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.002 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 4.24E-08 | µg/m³ | -- | -- | -- | 1.19E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 2.71E-05 | µg/m³ | 2.60E-04 | m³/µg | 7E-09 | 7.59E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0008 |
| | | | | Silver | 1.51E-05 | µg/m³ | 1.11E-06 | µg/m³ | -- | -- | -- | 3.10E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 4.66E-09 | µg/m³ | -- | -- | -- | 1.30E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.15E-06 | µg/m³ | -- | -- | -- | 3.22E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00003 |
| | | | | Zinc | 1.41E-03 | µg/m³ | 1.04E-04 | µg/m³ | -- | -- | -- | 2.90E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-08 | | | | | 0.006 |
| | | Exp. Point Total | | | | | | | | | 5E-08 | | | | | 0.006 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.41E+00 | µg/m³ | 1.77E-01 | µg/m³ | 1.60E-05 | m³/µg | 3E-06 | 4.94E-01 | µg/m³ | 2.00E-01 | µg/m³ | 2 |
| | | | | 2-Hexanone | 3.75E+00 | µg/m³ | 2.75E-01 | µg/m³ | -- | -- | -- | 7.70E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.03 |
| | | | | Benzene | 2.80E-01 | µg/m³ | 2.05E-02 | µg/m³ | 7.80E-06 | m³/µg | 2E-07 | 5.74E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.002 |
| | | | | Ethylbenzene | 8.03E-01 | µg/m³ | 5.89E-02 | µg/m³ | 2.50E-06 | m³/µg | 1E-07 | 1.65E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0002 |
| | | | | Naphthalene | 3.55E-02 | µg/m³ | 2.61E-03 | µg/m³ | 3.40E-05 | m³/µg | 9E-08 | 7.30E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.002 |
| | | | | Xylenes, Total | 1.70E+00 | µg/m³ | 1.25E-01 | µg/m³ | -- | -- | -- | 3.50E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.97E-04 | µg/m³ | 2.91E-05 | µg/m³ | 6.00E-05 | m³/µg | 2E-09 | 8.15E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.29E-09 | µg/m³ | 3.88E-10 | µg/m³ | 3.80E+01 | m³/µg | 1E-08 | 1.09E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.05E-02 | µg/m³ | 7.71E-04 | µg/m³ | -- | -- | -- | 2.16E-03 | µg/m³ | 3.00E-01 | µg/m³ | 0.007 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 3 |
| | | Exp. Point Total | | | | | | | | | 3E-06 | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | 3E-06 | | | | | 3 |
| Medium Total | | | | | | | | | | | 4E-05 | | | | | 3 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.27E-06 | µg/m³ | 2.60E-05 | m³/µg | 3E-11 | 3.57E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 4.83E-04 | µg/m³ | 7.80E-06 | m³/µg | 4E-09 | 1.35E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00005 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 9.69E-07 | µg/m³ | 2.30E-05 | m³/µg | 2E-11 | 2.71E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000003 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.23E-05 | µg/m³ | -- | -- | -- | 3.45E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 5.40E-04 | µg/m³ | 2.50E-06 | m³/µg | 1E-09 | 1.51E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000002 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 5.57E-05 | µg/m³ | -- | -- | -- | 1.56E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000004 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 2.30E-05 | µg/m³ | 3.40E-05 | m³/µg | 8E-10 | 6.45E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 9.39E-06 | µg/m³ | 2.60E-07 | m³/µg | 2E-12 | 2.63E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000007 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 1.71E-03 | µg/m³ | -- | -- | -- | 4.80E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.000001 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 1.83E-06 | µg/m³ | 4.10E-06 | m³/µg | 8E-12 | 5.14E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000003 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 1.44E-03 | µg/m³ | -- | -- | -- | 4.04E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 3.48E-07 | µg/m³ | -- | -- | -- | 9.75E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 5.85E-06 | µg/m³ | -- | -- | -- | 1.64E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |

Table 7-21.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 3.33E-10 | µg/m³ | 6.00E-05 | m³/µg | 2E-14 | 9.31E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 6.61E-08 | µg/m³ | -- | -- | -- | 1.85E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 7.24E-13 | µg/m³ | 3.80E+01 | m³/µg | 3E-11 | 2.03E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 9.74E-08 | µg/m³ | -- | -- | -- | 2.73E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000009 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 4E-05 | | | | Total of Receptor Hazards Across All Media | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-22.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 5.98E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 3E-08 | 4.18E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 1.84E-06 | mg/kg-day | -- | -- | -- | 1.29E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 1.61E+00 | mg/kg | 3.43E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 2E-09 | 2.40E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00006 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.67E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-09 | 1.17E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 6.21E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 7E-09 | 4.35E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 4.06E-07 | mg/kg-day | -- | -- | -- | 2.84E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 4.02E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | 9.37E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 1.47E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-06 | 3.44E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 4.28E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | 1.00E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 2.48E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-08 | 5.80E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 2.97E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-08 | 6.93E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 2.24E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 5E-10 | 1.57E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 5.51E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 7E-08 | 3.86E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 3.54E-04 | mg/kg-day | -- | -- | -- | 2.48E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 8.07E+01 | mg/kg | 1.72E-06 | mg/kg-day | -- | -- | -- | 1.21E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.03 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.25E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | 8.73E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 4.30E-07 | mg/kg-day | -- | -- | -- | 3.01E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.003 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 3.40E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-06 | 7.94E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 1.40E-07 | mg/kg-day | -- | -- | -- | 9.80E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Copper | 2.32E+03 | mg/kg | 4.94E-05 | mg/kg-day | -- | -- | -- | 3.46E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.01 |
| | | | | Iron | 5.68E+04 | mg/kg | 1.21E-03 | mg/kg-day | -- | -- | -- | 8.49E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Manganese | 5.63E+02 | mg/kg | 1.20E-05 | mg/kg-day | -- | -- | -- | 8.42E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.004 |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.68E-08 | mg/kg-day | -- | -- | -- | 1.17E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.0007 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.07E-05 | mg/kg-day | -- | -- | -- | 7.50E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.004 |
| | | | | Silver | 2.05E+01 | mg/kg | 4.38E-07 | mg/kg-day | -- | -- | -- | 3.07E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0006 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.84E-09 | mg/kg-day | -- | -- | -- | 1.29E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.001 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 4.54E-07 | mg/kg-day | -- | -- | -- | 3.18E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.0006 |
| | | | | Zinc | 1.92E+03 | mg/kg | 4.10E-05 | mg/kg-day | -- | -- | -- | 2.87E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | 4E-06 | | | | | 0.1 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 6.72E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 4E-08 | 4.71E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.06E-06 | mg/kg-day | -- | -- | -- | 1.45E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 1.61E+00 | mg/kg | 6.43E-10 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 4E-11 | 4.50E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.88E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-09 | 1.31E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 6.99E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 8E-09 | 4.89E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 4.57E-07 | mg/kg-day | -- | -- | -- | 3.20E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 4.57E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-09 | 4.57E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 1.68E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-07 | 1.68E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.06 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 4.87E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-09 | 4.87E-06 | mg/kg-day | -- | -- | -- |

Table 7-22.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 2.83E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-09 | 2.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 3.38E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-09 | 3.38E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.40E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-09 | 5.88E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 6.19E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 8E-08 | 4.34E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.33E-04 | mg/kg-day | -- | -- | -- | 9.29E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0009 |
| | | | | Antimony | 8.07E+01 | mg/kg | 6.46E-07 | mg/kg-day | -- | -- | -- | 4.52E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.08 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 2.34E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | 1.64E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.61E-08 | mg/kg-day | -- | -- | -- | 1.13E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 2.98E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 6E-07 | 2.98E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.04 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 5.25E-08 | mg/kg-day | -- | -- | -- | 3.67E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Copper | 2.32E+03 | mg/kg | 1.85E-05 | mg/kg-day | -- | -- | -- | 1.30E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.004 |
| | | | | Iron | 5.68E+04 | mg/kg | 4.55E-04 | mg/kg-day | -- | -- | -- | 3.18E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Manganese | 5.63E+02 | mg/kg | 4.51E-06 | mg/kg-day | -- | -- | -- | 3.16E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.03 |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.28E-09 | mg/kg-day | -- | -- | -- | 4.40E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.02E-06 | mg/kg-day | -- | -- | -- | 2.81E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.04 |
| | | | | Silver | 2.05E+01 | mg/kg | 1.64E-07 | mg/kg-day | -- | -- | -- | 1.15E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.006 |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.91E-10 | mg/kg-day | -- | -- | -- | 4.83E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.70E-07 | mg/kg-day | -- | -- | -- | 1.19E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.009 |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.54E-05 | mg/kg-day | -- | -- | -- | 1.08E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | 5E-06 | | | | | 0.4 |
| | Exp. Medium Total | | | | | | | | | | 5E-06 | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 2.90E-08 | µg/m³ | 1.60E-05 | m³/µg | 5E-13 | 2.03E-07 | µg/m³ | 2.00E-01 | µg/m³ | 0.000001 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 8.91E-08 | µg/m³ | -- | -- | -- | 6.24E-07 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | 1.66E-09 | µg/m³ | 7.80E-06 | m³/µg | 1E-14 | 1.17E-08 | µg/m³ | 3.00E+01 | µg/m³ | 4E-10 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 8.10E-09 | µg/m³ | 2.50E-06 | m³/µg | 2E-14 | 5.67E-08 | µg/m³ | 1.00E+03 | µg/m³ | 6E-11 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 3.02E-09 | µg/m³ | 3.40E-05 | m³/µg | 1E-13 | 2.11E-08 | µg/m³ | 3.00E+00 | µg/m³ | 7E-09 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 1.97E-08 | µg/m³ | -- | -- | -- | 1.38E-07 | µg/m³ | 1.00E+02 | µg/m³ | 1E-09 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 1.95E-08 | µg/m³ | 6.00E-05 | m³/µg | 1E-12 | 4.55E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 7.15E-08 | µg/m³ | 6.00E-04 | m³/µg | 4E-11 | 1.67E-07 | µg/m³ | 2.00E-03 | µg/m³ | 0.00008 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 2.08E-08 | µg/m³ | 6.00E-05 | m³/µg | 1E-12 | 4.85E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 1.21E-09 | µg/m³ | 6.00E-04 | m³/µg | 7E-13 | 2.82E-09 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 1.44E-08 | µg/m³ | 6.00E-05 | m³/µg | 9E-13 | 3.36E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.09E-10 | µg/m³ | 6.90E-05 | m³/µg | 8E-15 | 7.62E-10 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 2.67E-14 | µg/m³ | 3.80E+01 | m³/µg | 1E-12 | 1.87E-13 | µg/m³ | 4.00E-05 | µg/m³ | 5E-09 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 1.72E-05 | µg/m³ | -- | -- | -- | 1.20E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | 8.36E-08 | µg/m³ | -- | -- | -- | 5.85E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 1.01E-08 | µg/m³ | 4.30E-03 | m³/µg | 4E-11 | 7.07E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000005 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 2.09E-08 | µg/m³ | 1.80E-03 | m³/µg | 4E-11 | 1.46E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00001 |

Table 7-22.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 1.65E-07 | µg/m³ | 1.20E-02 | m³/µg | 2E-09 | 3.86E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00005 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 6.79E-09 | µg/m³ | 9.00E-03 | m³/µg | 6E-11 | 4.76E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000008 |
| | | | | Copper | 1.70E-03 | µg/m³ | 2.40E-06 | µg/m³ | -- | -- | -- | 1.68E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 5.89E-05 | µg/m³ | -- | -- | -- | 4.12E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 5.84E-07 | µg/m³ | -- | -- | -- | 4.09E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.00008 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 8.14E-10 | µg/m³ | -- | -- | -- | 5.70E-09 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 5.20E-07 | µg/m³ | 2.60E-04 | m³/µg | 1E-10 | 3.64E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00004 |
| | | | | Silver | 1.51E-05 | µg/m³ | 2.13E-08 | µg/m³ | -- | -- | -- | 1.49E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 8.95E-11 | µg/m³ | -- | -- | -- | 6.26E-10 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 2.20E-08 | µg/m³ | -- | -- | -- | 1.54E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000002 |
| | | | | Zinc | 1.41E-03 | µg/m³ | 1.99E-06 | µg/m³ | -- | -- | -- | 1.39E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-09 | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | 2E-09 | | | | | 0.0003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 3.80E+00 | µg/m³ | 5.36E-03 | µg/m³ | 1.60E-05 | m³/µg | 9E-08 | 3.75E-02 | µg/m³ | 2.00E-01 | µg/m³ | 0.2 |
| | | | | 2-Hexanone | 5.92E+00 | µg/m³ | 8.34E-03 | µg/m³ | -- | -- | -- | 5.84E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.002 |
| | | | | Benzene | 4.42E-01 | µg/m³ | 6.23E-04 | µg/m³ | 7.80E-06 | m³/µg | 5E-09 | 4.36E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.0001 |
| | | | | Ethylbenzene | 1.27E+00 | µg/m³ | 1.79E-03 | µg/m³ | 2.50E-06 | m³/µg | 4E-09 | 1.25E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00001 |
| | | | | Naphthalene | 5.61E-02 | µg/m³ | 7.91E-05 | µg/m³ | 3.40E-05 | m³/µg | 3E-09 | 5.54E-04 | µg/m³ | 3.00E+00 | µg/m³ | 0.0002 |
| | | | | Xylenes, Total | 2.69E+00 | µg/m³ | 3.79E-03 | µg/m³ | -- | -- | -- | 2.66E-02 | µg/m³ | 1.00E+02 | µg/m³ | 0.0003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E-04 | µg/m³ | 2.65E-06 | µg/m³ | 6.00E-05 | m³/µg | 2E-10 | 6.18E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 8.37E-09 | µg/m³ | 1.18E-11 | µg/m³ | 3.80E+01 | m³/µg | 4E-10 | 8.25E-11 | µg/m³ | 4.00E-05 | µg/m³ | 0.000002 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 6.37E-02 | µg/m³ | 8.98E-05 | µg/m³ | -- | -- | -- | 6.28E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.002 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.2 |
| | | Exp. Point Total | | | | | | | | | 1E-07 | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | 1E-07 | | | | | 0.2 |
| Medium Total | | | | | | | | | | | 5E-06 | | | | | 0.6 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 5E-06 | | | | Total of Receptor Hazards Across All Media | 0.6 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-23.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.99E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.05 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.13E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.1 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.14E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.57E-05 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0006 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.07E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.36E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0007 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.47E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.64E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.5 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.77E-05 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.76E-06 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.48E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.02 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.84E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.3 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.18E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.1 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.75E-04 | mg/kg-day | 4.00E-04 | mg/kg-day | 1 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.16E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.1 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.44E-04 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.1 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.79E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.1 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.67E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.2 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.65E-02 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.5 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.05E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.6 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 4.01E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.2 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.59E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.03 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.58E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.2 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.03 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 6.15E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.06 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.52E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.03 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-02 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.05 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.42E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.004 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.36E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.009 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.36E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.96E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00004 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.48E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00007 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 9.65E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00005 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.38E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.05E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.2 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.47E-05 | mg/kg-day | -- | -- | -- |

Table 7-23.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.53E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.02E-05 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.77E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.006 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.31E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.80E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.003 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.36E-05 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.2 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.94E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.41E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.98E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.1 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.11E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.91E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.01 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 9.60E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 9.52E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.1 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.33E-07 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.01 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 8.49E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.1 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.47E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.02 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.001 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.60E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.03 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.25E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.9 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 6 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 6 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.000008 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.07E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 9.47E-08 | µg/m³ | 3.00E+01 | µg/m³ | 3E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.61E-07 | µg/m³ | 1.00E+03 | µg/m³ | 5E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.72E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000006 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.12E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.70E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.0007 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.94E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.29E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.73E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.19E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.52E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.78E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 4.76E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.74E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00004 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.19E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0001 |

Table 7-23.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.13E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0004 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.86E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00006 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.37E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.35E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.32E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0007 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.63E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.96E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0003 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.21E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 5.09E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00001 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.13E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.89E-01 | µg/m³ | 2.00E-01 | µg/m³ | 0.9 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.94E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.20E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.0007 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 6.31E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00006 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.79E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.0009 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.34E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.12E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 4.16E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.26E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | | | | | -- | | | | | 7 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 7 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-24.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.87E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.005 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.74E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.07E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.22E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00005 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.94E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.27E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00006 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.19E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.54E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.05 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.47E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.59E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.10E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.01E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.72E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.11E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.39E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.1 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.90E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.35E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.55E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.01 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.38E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.55E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.05 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.79E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.05 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.76E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.02 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.24E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.003 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.35E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 5.76E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.006 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.42E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.28E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.4 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.92E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00007 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.95E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0002 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.79E-10 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00000007 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.14E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000008 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.03E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.98E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.04E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.02E-07 | mg/kg-day | -- | -- | -- |

Table 7-24.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.75E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.09E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.64E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 2.69E-13 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.0004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 5.76E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00006 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.80E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.005 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.00E-09 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0003 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.84E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.002 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.27E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00008 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 8.04E-06 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0002 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.97E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0003 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.95E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.002 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.72E-09 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0002 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.74E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.002 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.13E-08 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0004 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 3.00E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.38E-08 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.0006 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.67E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.5 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.000008 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.07E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 9.47E-08 | µg/m³ | 3.00E+01 | µg/m³ | 3E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.61E-07 | µg/m³ | 1.00E+03 | µg/m³ | 5E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.72E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000006 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.12E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.70E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.0007 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.94E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.29E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.73E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.19E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.52E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.78E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 4.76E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.74E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00004 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.19E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0001 |

Table 7-24.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | Value | Units | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.13E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0004 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.86E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00006 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.37E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.35E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.32E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0007 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.63E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.96E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0003 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.21E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 5.09E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00001 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.13E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.89E-01 | µg/m³ | 2.00E-01 | µg/m³ | 0.9 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.94E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.20E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.0007 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 6.31E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00006 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.79E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.0009 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.34E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.12E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 4.16E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.26E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | | | | | -- | | | | | 1 |
| Notes: | | | | | | | | | Total of Receptor Risks Across All Media | | -- | | | Total of Receptor Hazards Across All Media | | 1 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-25.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 2.24E-05 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 6.89E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 1.29E-06 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 6.27E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 2.33E-06 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 1.53E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 2.28E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 8.37E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-05 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.43E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.41E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.69E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.41E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 2.07E-11 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.33E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 6.46E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 4.68E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-06 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.62E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.93E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 5.25E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 1.86E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 4.55E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 4.51E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.29E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.02E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 1.65E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.92E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.70E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.54E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 1.30E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.99E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 1.24E-09 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 7E-11 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 3.63E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.35E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 8.84E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 7.61E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 2.79E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 8.12E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |

Table 7-25.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.71E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 5.63E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.63E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 1.20E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 2.57E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 1.25E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 4.52E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 3.12E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 4.96E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 1.01E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 3.59E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 8.79E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 8.72E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.22E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 7.77E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 3.18E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.34E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 3.29E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.97E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 3E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 3E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 1.79E-06 | µg/m³ | 1.60E-05 | m³/µg | 3E-11 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 5.50E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.18E-06 | µg/m³ | 1.03E-07 | µg/m³ | 7.80E-06 | m³/µg | 8E-13 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 5.00E-07 | µg/m³ | 2.50E-06 | m³/µg | 1E-12 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 1.86E-07 | µg/m³ | 3.40E-05 | m³/µg | 6E-12 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 1.22E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 3.80E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 1.39E-06 | µg/m³ | 6.00E-04 | m³/µg | 8E-10 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 4.06E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.35E-08 | µg/m³ | 6.00E-04 | m³/µg | 1E-11 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 2.81E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 6.72E-09 | µg/m³ | 6.90E-05 | m³/µg | 5E-13 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.65E-12 | µg/m³ | 3.80E+01 | m³/µg | 6E-11 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 1.06E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 5.93E-05 | µg/m³ | 5.16E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 6.23E-07 | µg/m³ | 4.30E-03 | m³/µg | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 1.29E-06 | µg/m³ | 1.80E-03 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |

Table 7-25.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 3.22E-06 | µg/m³ | 1.20E-02 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 4.20E-07 | µg/m³ | 9.00E-03 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Copper | 1.70E-03 | µg/m³ | 1.48E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 3.64E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 3.61E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 5.77E-07 | µg/m³ | 5.02E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 3.69E-04 | µg/m³ | 3.21E-05 | µg/m³ | 2.60E-04 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Silver | 1.51E-05 | µg/m³ | 1.31E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 5.52E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.36E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.41E-03 | µg/m³ | 1.23E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 6E-08 | | | | | -- |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | 2.05E-01 | µg/m³ | 1.60E-05 | m³/µg | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | 3.20E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.74E-01 | µg/m³ | 2.38E-02 | µg/m³ | 7.80E-06 | m³/µg | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | 6.85E-02 | µg/m³ | 2.50E-06 | m³/µg | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | 3.03E-03 | µg/m³ | 3.40E-05 | m³/µg | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | 1.45E-01 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | 3.21E-05 | µg/m³ | 6.00E-05 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | 4.52E-10 | µg/m³ | 3.80E+01 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.03E-02 | µg/m³ | 8.97E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 4E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 4E-06 | | | | | -- |
| Medium Total | | | | | | | | | | | 3E-04 | | | | | -- |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 3E-04 | | | | Total of Receptor Hazards Across All Media | | -- |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.
(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-26.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 3.17E-03 | mg/kg-day | -- | -- | -- | 8.87E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.009 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 4.12E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-07 | 1.15E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 2.94E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-06 | 8.22E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 9.39E-07 | mg/kg-day | -- | -- | -- | 2.63E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Iron | 8.70E+03 | mg/kg | 2.39E-03 | mg/kg-day | -- | -- | -- | 6.70E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.00E-08 | mg/kg-day | -- | -- | -- | 8.40E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.008 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.04 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.34E-04 | mg/kg-day | -- | -- | -- | 3.76E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0004 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 8.72E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 2.44E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.24E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-06 | 3.48E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.97E-08 | mg/kg-day | -- | -- | -- | 1.11E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.01E-04 | mg/kg-day | -- | -- | -- | 2.84E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0004 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.27E-09 | mg/kg-day | -- | -- | -- | 3.55E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 0.007 |
| | | Exp. Point Total | | | | | | | | | 5E-06 | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | 5E-06 | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 6.22E-04 | µg/m³ | -- | -- | -- | 1.74E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0003 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 1.35E-07 | µg/m³ | 4.30E-03 | m³/µg | 6E-10 | 3.77E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00003 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 5.76E-07 | µg/m³ | 1.20E-02 | m³/µg | 7E-09 | 1.61E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 1.84E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | 5.16E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00009 |
| | | | | Iron | 6.40E-03 | µg/m³ | 4.70E-04 | µg/m³ | -- | -- | -- | 1.31E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 5.88E-09 | µg/m³ | -- | -- | -- | 1.65E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-09 | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | 9E-09 | | | | | 0.0007 |
| | Exp. Medium Total | | | | | | | | | | 9E-09 | | | | | 0.0007 |
| Medium Total | | | | | | | | | | | 5E-06 | | | | | 0.05 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.27E-06 | µg/m³ | 2.60E-05 | m³/µg | 3E-11 | 3.57E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 4.83E-04 | µg/m³ | 7.80E-06 | m³/µg | 4E-09 | 1.35E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00005 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 9.69E-07 | µg/m³ | 2.30E-05 | m³/µg | 2E-11 | 2.71E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000003 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.23E-05 | µg/m³ | -- | -- | -- | 3.45E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 5.40E-04 | µg/m³ | 2.50E-06 | m³/µg | 1E-09 | 1.51E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000002 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 5.57E-05 | µg/m³ | -- | -- | -- | 1.56E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000004 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 2.30E-05 | µg/m³ | 3.40E-05 | m³/µg | 8E-10 | 6.45E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 9.39E-06 | µg/m³ | 2.60E-07 | m³/µg | 2E-12 | 2.63E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000007 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 1.71E-03 | µg/m³ | -- | -- | -- | 4.80E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.000001 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 1.83E-06 | µg/m³ | 4.10E-06 | m³/µg | 8E-12 | 5.14E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000003 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 1.44E-03 | µg/m³ | -- | -- | -- | 4.04E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-26.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 3.48E-07 | µg/m³ | -- | -- | -- | 9.75E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 5.85E-06 | µg/m³ | -- | -- | -- | 1.64E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 3.33E-10 | µg/m³ | 6.00E-05 | m³/µg | 2E-14 | 9.31E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 6.61E-08 | µg/m³ | -- | -- | -- | 1.85E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 7.24E-13 | µg/m³ | 3.80E+01 | m³/µg | 3E-11 | 2.03E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 9.74E-08 | µg/m³ | -- | -- | -- | 2.73E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000009 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 5E-06 | | | | | 0.05 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-27.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 2.46E-04 | mg/kg-day | -- | -- | -- | 1.72E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 3.20E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-08 | 2.24E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 6.83E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-07 | 1.59E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 7.28E-08 | mg/kg-day | -- | -- | -- | 5.10E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.86E-04 | mg/kg-day | -- | -- | -- | 1.30E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.09E-01 | mg/kg | 2.33E-09 | mg/kg-day | -- | -- | -- | 1.63E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | 0.008 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.22E-05 | mg/kg-day | -- | -- | -- | 6.45E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 5.99E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 9E-08 | 4.19E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 5.98E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-07 | 5.98E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.008 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.73E-08 | mg/kg-day | -- | -- | -- | 1.91E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Iron | 8.70E+03 | mg/kg | 6.96E-05 | mg/kg-day | -- | -- | -- | 4.87E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0007 |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.72E-10 | mg/kg-day | -- | -- | -- | 6.11E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | 6E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 6E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.19E-05 | µg/m³ | -- | -- | -- | 8.35E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.00002 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 2.59E-09 | µg/m³ | 4.30E-03 | m³/µg | 1E-11 | 1.81E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 3.32E-08 | µg/m³ | 1.20E-02 | m³/µg | 4E-10 | 7.74E-08 | µg/m³ | 8.00E-03 | µg/m³ | 0.00001 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 3.54E-09 | µg/m³ | 9.00E-03 | m³/µg | 3E-11 | 2.47E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000004 |
| | | | | Iron | 6.40E-03 | µg/m³ | 9.02E-06 | µg/m³ | -- | -- | -- | 6.31E-05 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.13E-10 | µg/m³ | -- | -- | -- | 7.91E-10 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-10 | | | | | 0.00003 |
| | | Exp. Point Total | | | | | | | | | 4E-10 | | | | | 0.00003 |
| | Exp. Medium Total | | | | | | | | | | 4E-10 | | | | | 0.00003 |
| Medium Total | | | | | | | | | | | 6E-07 | | | | | 0.02 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 6E-07 | | | | Total of Receptor Hazards Across All Media | 0.02 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-28.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.20E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.08 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.07E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.04 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.60E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.03 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.43E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.08 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.20E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.09 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.76E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.08 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.4 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.95E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.27E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.80E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.02 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.77E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.47E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.84E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.4 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.79E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0001 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.47E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.29E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00008 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.01E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00003 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 5.13E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.43E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.4 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-29.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 7.69E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.008 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.00E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.13E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.002 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.28E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 5.81E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.008 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.28E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.00E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00004 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.60E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00009 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.70E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0005 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.18E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00004 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.02E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00004 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.78E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.04 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.04 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.79E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0001 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.47E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 6.29E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00008 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.01E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00003 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 5.13E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.43E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.04 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-30.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.23E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 1.20E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.88E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.73E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 6.97E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.73E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.78E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 1.16E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 9.96E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 5.28E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 1.35E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.69E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 4E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 4E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 7.37E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 1.60E-07 | µg/m³ | 4.30E-03 | m³/µg | 7E-10 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 6.47E-07 | µg/m³ | 1.20E-02 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 2.18E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Iron | 6.40E-03 | µg/m³ | 5.57E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 6.98E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-08 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-08 | | | | | -- |
| Medium Total | | | | | | | | | | | 4E-05 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-31.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 7.94E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 5.56E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 2.73E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-06 | 3.18E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Exp. Route Total | | | | | | | 1E-06 | | | | | 0.003 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 7.37E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 5.16E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 8.86E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-06 | 5.90E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0008 |
| | | | | Exp. Route Total | | | | | | | 2E-06 | | | | | 0.001 |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | 5.66E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 1E-10 | 3.96E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0001 |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | 3.52E-08 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 1E-08 | 2.47E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | 7.37E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-09 | 5.16E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00002 |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | 7.26E-12 | mg/kg-day | -- | -- | -- | 5.08E-11 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00000005 |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | 2.82E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-08 | 3.29E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00001 |
| | | | | Copper | 6.60E+01 | mg/kg | 7.05E-09 | mg/kg-day | -- | -- | -- | 4.93E-08 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.000002 |
| | | | | Nickel | 9.50E+00 | mg/kg | 1.01E-09 | mg/kg-day | -- | -- | -- | 7.10E-09 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0000004 |
| | | | | Selenium | 2.60E+00 | mg/kg | 2.78E-10 | mg/kg-day | -- | -- | -- | 1.94E-09 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0000004 |
| | | | | Silver | 1.10E+00 | mg/kg | 1.17E-10 | mg/kg-day | -- | -- | -- | 8.22E-10 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0000002 |
| | | | | Zinc | 4.70E+02 | mg/kg | 5.02E-08 | mg/kg-day | -- | -- | -- | 3.51E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000001 |
| | | | | Exp. Route Total | | | | | | | 3E-08 | | | | | 0.001 |
| | | Exp. Point Total | | | | | | | | | 3E-06 | | | | | 0.005 |
| | Exp. Medium Total | | | | | | | | | | 3E-06 | | | | | 0.005 |
| Medium Total | | | | | | | | | | | 3E-06 | | | | | 0.005 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 8.21E-08 | mg/kg-day | -- | -- | -- | 5.74E-07 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.001 |
| | | | | Arsenic | 1.17E-02 | mg/L | 1.55E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | 1.08E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Iron | 1.03E+00 | mg/L | 1.36E-05 | mg/kg-day | -- | -- | -- | 9.54E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0001 |
| | | | | Exp. Route Total | | | | | | | 2E-07 | | | | | 0.005 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 1.23E-08 | mg/kg-day | -- | -- | -- | 8.60E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.001 |
| | | | | Arsenic | 1.17E-02 | mg/L | 2.32E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-08 | 1.62E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0005 |
| | | | | Iron | 1.03E+00 | mg/L | 2.04E-06 | mg/kg-day | -- | -- | -- | 1.43E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00002 |
| | | | | Exp. Route Total | | | | | | | 3E-08 | | | | | 0.002 |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | 4.65E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-08 | 3.25E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | 3.18E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-08 | 3.71E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00001 |
| | | | | Nickel | 2.90E-04 | mg/kg | 3.84E-09 | mg/kg-day | -- | -- | -- | 2.69E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000001 |
| | | | | Selenium | 2.36E-03 | mg/kg | 3.12E-08 | mg/kg-day | -- | -- | -- | 2.19E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00004 |
| | | | | Exp. Route Total | | | | | | | 9E-08 | | | | | 0.001 |

Table 7-31.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | 3E-07 | | | | | 0.008 |
| | Exp. Medium Total | | | | | | | | | | 3E-07 | | | | | 0.008 |
| Medium Total | | | | | | | | | | | 3E-07 | | | | | 0.008 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 4E-06 | | | | | 0.01 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-32.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.66E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.09 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.52E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.05 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.1 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.19E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.66E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.05 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.06 |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.90E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.006 |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.18E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.04 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.47E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.43E-09 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.000002 |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.58E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0005 |
| | | | | Copper | 6.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.36E-06 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.00007 |
| | | | | Nickel | 9.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.40E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Selenium | 2.60E+00 | mg/kg | (2) | -- | -- | -- | -- | 9.31E-08 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00002 |
| | | | | Silver | 1.10E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.94E-08 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.000008 |
| | | | | Zinc | 4.70E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.68E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.2 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.2 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.33E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.03 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 2.51E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.08 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 2.21E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.1 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.32E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.009 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 1.00E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 8.84E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | (2) | -- | -- | -- | -- | 7.54E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | (2) | -- | -- | -- | -- | 8.59E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Nickel | 2.90E-04 | mg/kg | (2) | -- | -- | -- | -- | 6.23E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00003 |
| | | | | Selenium | 2.36E-03 | mg/kg | (2) | -- | -- | -- | -- | 5.07E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.03 |

Table 7-32.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.2 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.2 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-33.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.50E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.43E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.40E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.33E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.78E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0006 |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.11E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.32E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00008 |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.28E-10 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.0000002 |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.48E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00005 |
| | | | | Copper | 6.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.22E-07 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.000007 |
| | | | | Nickel | 9.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.19E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000002 |
| | | | | Selenium | 2.60E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.73E-09 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.000002 |
| | | | | Silver | 1.10E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.69E-09 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0000007 |
| | | | | Zinc | 4.70E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.58E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.03 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.05E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.005 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 3.87E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 3.40E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.05E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.005 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 5.75E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 5.06E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00007 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.007 |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | (2) | -- | -- | -- | -- | 1.16E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | (2) | -- | -- | -- | -- | 1.32E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00004 |
| | | | | Nickel | 2.90E-04 | mg/kg | (2) | -- | -- | -- | -- | 9.59E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000005 |
| | | | | Selenium | 2.36E-03 | mg/kg | (2) | -- | -- | -- | -- | 7.80E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |

Table 7-33.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.03 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 0.06 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-34.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 3.00E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 5.96E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 4.57E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 1.60E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-05 | | | | | -- |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | 2.13E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | 1.33E-06 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | 2.78E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | 2.74E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | 6.16E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Copper | 6.60E+01 | mg/kg | 2.66E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 9.50E+00 | mg/kg | 3.83E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Selenium | 2.60E+00 | mg/kg | 1.05E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 1.10E+00 | mg/kg | 4.43E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 4.70E+02 | mg/kg | 1.89E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 8E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-05 | | | | | -- |
| Medium Total | | | | | | | | | | | 7E-05 | | | | | -- |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 1.73E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.17E-02 | mg/L | 3.26E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.03E+00 | mg/L | 2.87E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-06 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 1.33E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.17E-02 | mg/L | 2.50E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.03E+00 | mg/L | 2.20E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | -- |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | 9.78E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | 3.58E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Nickel | 2.90E-04 | mg/kg | 8.08E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Selenium | 2.36E-03 | mg/kg | 6.57E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | -- |

Table 7-34.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | 7E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-06 | | | | | -- |
| Medium Total | | | | | | | | | | | 7E-06 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 7E-05 | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-35.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Maintenance Worker - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 2.20E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-06 | 6.15E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 7.57E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 4E-06 | 2.12E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.007 |
| | | | Exp. Route Total | | | | | | | | 7E-06 | | | | | 0.03 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 4.65E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | 1.30E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 3.20E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 6E-06 | 8.97E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | 7E-06 | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | 1E-05 | | | | | 0.04 |
| | Exp. Medium Total | | | | | | | | | | 1E-05 | | | | | 0.04 |
| Medium Total | | | | | | | | | | | 1E-05 | | | | | 0.04 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 1E-05 | | | | | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-36.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Trespasser (Teen) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 8.52E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 5.96E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 1.76E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 9E-07 | 2.05E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0007 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.003 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 7.90E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 5.53E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 5.72E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-06 | 3.81E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0005 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | 2E-06 | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | 2E-06 | | | | | 0.003 |
| Medium Total | | | | | | | | | | | 2E-06 | | | | | 0.003 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 2E-06 | | | | | 0.003 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-37.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Child) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.86E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.1 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 9.84E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.03 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.1 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.43E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.36E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.03 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.2 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.2 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.2 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-38.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.68E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 9.23E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.87E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.73E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.009 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.02 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-39.RME
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 3.21E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 3.85E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 4.90E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 1.03E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 5E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 5E-05 | | | | | -- |
| Medium Total | | | | | | | | | | | 5E-05 | | | | | -- |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 5E-05 | | | | Total of Receptor Hazards Across All Media | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

# Summary of Chemical Cancer Risks and Non-Cancer Hazards for Constituents of Interest: Reasonable Maximum Exposure

Table 9-1.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 7E-08 | 4E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 2E-07 | 1E-07 | -- | 3E-07 | DV | 0.002 | 0.001 | -- | 0.003 |
| | | | Benzo(b)fluoranthene | 4E-08 | 2E-08 | -- | 6E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-07 | 6E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 7E-09 | 3E-09 | -- | 1E-08 | HP | 0.003 | 0.001 | -- | 0.004 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 9E-07 | 1E-07 | -- | 1E-06 | RP | 0.03 | 0.004 | -- | 0.03 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.02 | 0.0007 | -- | 0.02 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.06 | 0.02 | -- | 0.08 |
| | | | Arsenic | 1E-06 | 3E-07 | -- | 2E-06 | CV; DM | 0.008 | 0.002 | -- | 0.009 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.02 | 0.003 | -- | 0.02 |
| | | | Chromium, Total | 2E-05 | 4E-05 | -- | 6E-05 | NA | 0.04 | 0.07 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.03 | 0.001 | -- | 0.03 |
| | | | Copper | -- | -- | -- | -- | GI | 0.06 | 0.002 | -- | 0.06 |
| | | | Iron | -- | -- | -- | -- | GI | 0.05 | 0.002 | -- | 0.05 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.01 | 0.01 | -- | 0.03 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.004 | 0.002 | -- | 0.006 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.02 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.008 | 0.008 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.0003 | -- | 0.007 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.003 | 0.005 | -- | 0.009 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.004 | 0.0002 | -- | 0.005 |
| | | | Chemical Total | 3E-05 | 4E-05 | -- | 6E-05 | | 0.4 | 0.2 | -- | 0.5 |
| | | Exposure Point Total | | | | | 6E-05 | | | | | 0.5 |
| Exposure Medium Total | | | | | | | 6E-05 | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 8E-12 | 8E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 2E-11 | 2E-11 | DV | -- | -- | 0.00005 | 0.00005 |
| | | | Benzo(b)fluoranthene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 4E-13 | 4E-13 | -- | -- | -- | -- | -- |

Table 9-1.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-11 | 5E-11 | -- | -- | -- | 0.0000001 | 0.0000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0006 | 0.0006 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | 1E-09 | 1E-09 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00005 | 0.00005 |
| | | | Cadmium (Diet) | -- | -- | 2E-09 | 2E-09 | UR | -- | -- | 0.0003 | 0.0003 |
| | | | Chromium, Total | -- | -- | 1E-07 | 1E-07 | RS | -- | -- | 0.003 | 0.003 |
| | | | Cobalt | -- | -- | 5E-09 | 5E-09 | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.001 | 0.001 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Nickel | -- | -- | 7E-09 | 7E-09 | RS | -- | -- | 0.0008 | 0.0008 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-07 | 1E-07 | | -- | -- | 0.007 | 0.007 |
| | | Exposure Point Total | | | | | 1E-07 | | | | | 0.007 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | 0.00003 | 0.00003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.007 | 0.007 |
| | | | Chemical Total | -- | -- | 2E-08 | 2E-08 | | -- | -- | 0.007 | 0.007 |
| | | Exposure Point Total | | | | | 2E-08 | | | | | 0.007 |
| | Exposure Medium Total | | | | | | 1E-07 | | | | | 0.01 |
| Medium Total | | | | | | | 7E-05 | | | | | 0.5 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 3E-11 | 3E-11 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 4E-09 | 4E-09 | IM | -- | -- | 0.00005 | 0.00005 |
| | | | Chloroform | -- | -- | 2E-11 | 2E-11 | HP | -- | -- | 0.00000003 | 0.00000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-1.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Ethylbenzene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000004 | 0.0000004 |
| | | | Naphthalene | -- | -- | 8E-10 | 8E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 2E-12 | 2E-12 | NV | -- | -- | 0.0000007 | 0.0000007 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Trichloroethene | -- | -- | 8E-12 | 8E-12 | DV; IM | -- | -- | 0.000003 | 0.000003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 2E-14 | 2E-14 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Chemical Total | -- | -- | 6E-09 | 6E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 6E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | Receptor Risk Total | 7E-05 | | | | Receptor Hazard Index (HI) | 0.5 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.009 |
| Total Dermal (DM) HI across All Media = | 0.04 |
| Total Developmental (DV) HI across All Media = | 0.003 |
| Total Endocrine (EN) HI across All Media = | 0.03 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.09 |
| Total Hepatic (HP) HI across All Media = | 0.004 |
| Total Immune (IM) HI across All Media = | 0.00005 |
| Total Nervous (NV) HI across All Media = | 0.05 |
| Total Other (OT) HI across All Media = | 0.1 |
| Total Reproductive (RP) HI across All Media = | 0.03 |
| Total Respiratory (RS) HI across All Media = | 0.004 |
| Total Urinary (UR) HI across All Media = | 0.02 |

Table 9-2.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 2E-08 | 2E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 4E-08 | 5E-09 | -- | 5E-08 | DV | 0.0003 | 0.002 | -- | 0.002 |
| | | | Benzo(b)fluoranthene | 9E-09 | 1E-09 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 2E-08 | 3E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 5E-10 | 2E-09 | -- | 3E-09 | HP | 0.0005 | 0.002 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 7E-08 | 8E-08 | -- | 2E-07 | RP | 0.006 | 0.006 | -- | 0.01 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.003 | 0.001 | -- | 0.004 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.01 | 0.03 | -- | 0.04 |
| | | | Arsenic | 1E-07 | 2E-07 | -- | 3E-07 | CV; DM | 0.001 | 0.003 | -- | 0.004 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.003 | 0.005 | -- | 0.008 |
| | | | Chromium, Total | 5E-06 | 2E-06 | -- | 7E-06 | NA | 0.008 | 0.1 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.005 | 0.002 | -- | 0.007 |
| | | | Copper | -- | -- | -- | -- | GI | 0.01 | 0.004 | -- | 0.02 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.004 | -- | 0.01 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.003 | 0.02 | -- | 0.03 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.0007 | 0.004 | -- | 0.005 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.004 | 0.04 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.002 | 0.01 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.0005 | -- | 0.002 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.0006 | 0.009 | -- | 0.01 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0008 | 0.0003 | -- | 0.001 |
| | | | Chemical Total | 6E-06 | 2E-06 | -- | 8E-06 | | 0.07 | 0.3 | -- | 0.3 |
| | | Exposure Point Total | | | | | 8E-06 | | | | | 0.3 |
| | Exposure Medium Total | | | | | | 8E-06 | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 5E-13 | 5E-13 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 1E-12 | 1E-12 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Benzo(b)fluoranthene | -- | -- | 3E-13 | 3E-13 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 7E-13 | 7E-13 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 8E-15 | 8E-15 | -- | -- | -- | -- | -- |

Table 9-2.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | 0.000000005 | 0.000000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00003 | 0.00003 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.0000008 | 0.0000008 |
| | | | Arsenic | -- | -- | 2E-11 | 2E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000002 | 0.000002 |
| | | | Cadmium (Diet) | -- | -- | 4E-11 | 4E-11 | UR | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | 6E-09 | 6E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Cobalt | -- | -- | 1E-10 | 1E-10 | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000002 | 0.00000002 |
| | | | Nickel | -- | -- | 1E-10 | 1E-10 | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 7E-09 | 7E-09 | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | 7E-09 | | | | | 0.0003 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 6E-11 | 6E-11 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-10 | 4E-10 | -- | -- | -- | 0.000002 | 0.000002 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Chemical Total | -- | -- | 5E-10 | 5E-10 | | -- | -- | 0.002 | 0.002 |
| | | Exposure Point Total | | | | | 5E-10 | | | | | 0.002 |
| | Exposure Medium Total | | | | | | 7E-09 | | | | | 0.002 |
| Medium Total | | | | | | | 8E-06 | | | | | 0.3 |
| Notes: | | | | | | Receptor Risk Total | 8E-06 | | | | Receptor Hazard Index (HI) | 0.3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.004 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.002 |
| Total Endocrine (EN) HI across All Media = | 0.007 |

Table 9-2.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Hematological (HM) HI across All Media = | | | 0.04 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.002 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.08 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.01 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.0002 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.008 |

Table 9-3.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.02 | 0.005 | -- | 0.02 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.02 | 0.006 | -- | 0.03 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.3 | 0.02 | -- | 0.3 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.1 | 0.003 | -- | 0.1 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.6 | 0.09 | -- | 0.7 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.07 | 0.008 | -- | 0.08 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.2 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.4 | 0.4 | -- | 0.8 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.2 | 0.006 | -- | 0.2 |
| | | | Copper | -- | -- | -- | -- | GI | 0.5 | 0.01 | -- | 0.5 |
| | | | Iron | -- | -- | -- | -- | GI | 0.5 | 0.01 | -- | 0.5 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.1 | 0.07 | -- | 0.2 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.03 | 0.01 | -- | 0.05 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.2 | 0.1 | -- | 0.3 |
| | | | Silver | -- | -- | -- | -- | DM | 0.07 | 0.04 | -- | 0.1 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.06 | 0.001 | -- | 0.06 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.03 | 0.03 | -- | 0.06 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.04 | 0.001 | -- | 0.04 |
| | | | Chemical Total | -- | -- | -- | -- | | 3 | 0.8 | -- | 4 |
| | | Exposure Point Total | | | | | -- | | | | | 4 |
| | Exposure Medium Total | | | | | | -- | | | | | 4 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.00002 | 0.00002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-3.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000004 | 0.00000004 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000006 | 0.000006 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.001 | 0.001 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0005 | 0.0005 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.005 |
| Medium Total | | | | | | | -- | | | | | 4 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.08 |
| Total Dermal (DM) HI across All Media = | 0.3 |
| Total Developmental (DV) HI across All Media = | 0.02 |
| Total Endocrine (EN) HI across All Media = | 0.2 |

Table 9-3.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 1 |
| | | | | | | | | | Total Hematological (HM) HI across All Media = | | | 0.7 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 0.4 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 1 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.3 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.002 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.2 |

Table 9-4.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.002 | 0.0001 | -- | 0.002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.002 | 0.0001 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.02 | 0.0004 | -- | 0.02 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.00007 | -- | 0.01 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.05 | 0.002 | -- | 0.06 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.007 | 0.0002 | -- | 0.007 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.01 | 0.0003 | -- | 0.01 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.04 | 0.008 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.02 | 0.0001 | -- | 0.02 |
| | | | Copper | -- | -- | -- | -- | GI | 0.05 | 0.0003 | -- | 0.05 |
| | | | Iron | -- | -- | -- | -- | GI | 0.05 | 0.0002 | -- | 0.05 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.01 | 0.002 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.003 | 0.0002 | -- | 0.004 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.002 | -- | 0.02 |
| | | | Silver | -- | -- | -- | -- | DM | 0.007 | 0.0009 | -- | 0.008 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.006 | 0.00003 | -- | 0.006 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.003 | 0.0006 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.004 | 0.00002 | -- | 0.004 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.3 | 0.02 | -- | 0.3 |
| | | Exposure Point Total | | | | | -- | | | | | 0.3 |
| Exposure Medium Total | | | | | | | -- | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.00002 | 0.00002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-4.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000004 | 0.00000004 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000006 | 0.000006 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.001 | 0.001 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0005 | 0.0005 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.005 |
| Medium Total | | | | | | | -- | | | | | 0.3 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.007 |
| Total Dermal (DM) HI across All Media = | 0.02 |
| Total Developmental (DV) HI across All Media = | 0.002 |
| Total Endocrine (EN) HI across All Media = | 0.02 |

Table 9-4.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 0.1 |
| | | | | | | | | | Total Hematological (HM) HI across All Media = | | | 0.06 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.002 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.08 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.002 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.01 |

Table 9-5.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 9E-07 | 3E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 3E-06 | 8E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 5E-07 | 2E-07 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-06 | 5E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 2E-08 | 4E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-06 | 2E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 4E-06 | 3E-07 | -- | 4E-06 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 3E-04 | 3E-04 | -- | 6E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 3E-04 | 3E-04 | -- | 6E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 6E-04 | | | | | -- |
| Exposure Medium Total | | | | | | | 6E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 9E-12 | 9E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 5E-13 | 5E-13 | -- | -- | -- | -- | -- |

Table 9-5.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 6E-11 | 6E-11 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 6E-09 | 6E-09 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-07 | 1E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-07 | | | | | -- |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 8E-10 | 8E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-08 | 2E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-08 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-07 | | | | | -- |
| Medium Total | | | | | | | 6E-04 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 6E-04 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-6.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.009 | 0.0004 | -- | 0.009 |
| | | | Arsenic | 7E-07 | 2E-07 | -- | 9E-07 | CV; DM | 0.005 | 0.001 | -- | 0.006 |
| | | | Chromium, Total | 1E-06 | 2E-06 | -- | 4E-06 | NA | 0.003 | 0.005 | -- | 0.007 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.009 | 0.0004 | -- | 0.009 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.0004 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.008 | 0.0004 | -- | 0.009 |
| | | | Chemical Total | 2E-06 | 3E-06 | -- | 5E-06 | | 0.04 | 0.007 | -- | 0.05 |
| | | Exposure Point Total | | | | | 5E-06 | | | | | 0.05 |
| | Exposure Medium Total | | | | | | 5E-06 | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Arsenic | -- | -- | 7E-10 | 7E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | 7E-09 | 7E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 9E-09 | 9E-09 | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | 9E-09 | | | | | 0.0007 |
| | Exposure Medium Total | | | | | | 9E-09 | | | | | 0.0007 |
| Medium Total | | | | | | | 5E-06 | | | | | 0.05 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 3E-11 | 3E-11 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 4E-09 | 4E-09 | IM | -- | -- | 0.00005 | 0.00005 |
| | | | Chloroform | -- | -- | 2E-11 | 2E-11 | HP | -- | -- | 0.00000003 | 0.00000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000004 | 0.0000004 |
| | | | Naphthalene | -- | -- | 8E-10 | 8E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 2E-12 | 2E-12 | NV | -- | -- | 0.0000007 | 0.0000007 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Trichloroethene | -- | -- | 8E-12 | 8E-12 | DV; IM | -- | -- | 0.000003 | 0.000003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |

Table 9-6.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 2E-14 | 2E-14 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Chemical Total | -- | -- | 6E-09 | 6E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 6E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 6E-09 | | | | | 0.0001 |
| | | | | | | Receptor Risk Total | 5E-06 | | | | Receptor Hazard Index (HI) | 0.05 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.006 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.00003 |
| Total Endocrine (EN) HI across All Media = | 0.009 |
| Total Gastrointestinal (GI) HI across All Media = | 0.01 |
| Total Hepatic (HP) HI across All Media = | 0.000002 |
| Total Immune (IM) HI across All Media = | 0.00005 |
| Total Nervous (NV) HI across All Media = | 0.01 |
| Total Reproductive (RP) HI across All Media = | 0.00003 |
| Total Respiratory (RS) HI across All Media = | 0.0003 |
| Total Urinary (UR) HI across All Media = | 0.000002 |

Table 9-7.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.002 | 0.0006 | -- | 0.002 |
| | | | Arsenic | 6E-08 | 1E-07 | -- | 2E-07 | CV; DM | 0.0009 | 0.002 | -- | 0.003 |
| | | | Chromium, Total | 3E-07 | 1E-07 | -- | 5E-07 | NA | 0.0005 | 0.008 | -- | 0.008 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.002 | 0.0006 | -- | 0.002 |
| | | | Iron | -- | -- | -- | -- | GI | 0.002 | 0.0007 | -- | 0.003 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.002 | 0.0006 | -- | 0.002 |
| | | | Chemical Total | 4E-07 | 2E-07 | -- | 6E-07 | | 0.008 | 0.01 | -- | 0.02 |
| | | Exposure Point Total | | | | | 6E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 6E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | 1E-11 | 1E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000001 | 0.000001 |
| | | | Chromium, Total | -- | -- | 4E-10 | 4E-10 | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Cobalt | -- | -- | 3E-11 | 3E-11 | RS | -- | -- | 0.000004 | 0.000004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 4E-10 | 4E-10 | | -- | -- | 0.00003 | 0.00003 |
| | | Exposure Point Total | | | | | 4E-10 | | | | | 0.00003 |
| | Exposure Medium Total | | | | | | 4E-10 | | | | | 0.00003 |
| Medium Total | | | | | | | 6E-07 | | | | | 0.02 |
| | | | | | | Receptor Risk Total | 6E-07 | | | | Receptor Hazard Index (HI) | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.003 |
| Total Dermal (DM) HI across All Media = | 0.005 |
| Total Developmental (DV) HI across All Media = | 0.000001 |
| Total Endocrine (EN) HI across All Media = | 0.002 |
| Total Gastrointestinal (GI) HI across All Media = | 0.003 |
| Total Nervous (NV) HI across All Media = | 0.002 |
| Total Reproductive (RP) HI across All Media = | 0.000001 |
| Total Respiratory (RS) HI across All Media = | 0.00002 |

Table 9-8.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.08 | 0.002 | -- | 0.08 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.04 | 0.005 | -- | 0.05 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.03 | 0.02 | -- | 0.05 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.08 | 0.002 | -- | 0.08 |
| | | | Iron | -- | -- | -- | -- | GI | 0.09 | 0.002 | -- | 0.09 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.08 | 0.002 | -- | 0.08 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.4 | 0.04 | -- | 0.4 |
| | | Exposure Point Total | | | | | -- | | | | | 0.4 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | -- | | | | | 0.4 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.05 |
| Total Dermal (DM) HI across All Media = | 0.1 |
| Total Developmental (DV) HI across All Media = | 0.00001 |
| Total Endocrine (EN) HI across All Media = | 0.08 |
| Total Gastrointestinal (GI) HI across All Media = | 0.09 |
| Total Nervous (NV) HI across All Media = | 0.08 |
| Total Reproductive (RP) HI across All Media = | 0.00001 |
| Total Respiratory (RS) HI across All Media = | 0.0001 |

Table 9-9.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.008 | 0.00004 | -- | 0.008 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.004 | 0.0001 | -- | 0.004 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.002 | 0.0005 | -- | 0.003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.008 | 0.00004 | -- | 0.008 |
| | | | Iron | -- | -- | -- | -- | GI | 0.008 | 0.00004 | -- | 0.008 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.00004 | -- | 0.007 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.04 | 0.0008 | -- | 0.04 |
| | | Exposure Point Total | | | | | -- | | | | | 0.04 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.04 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | -- | | | | | 0.04 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.004 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.00001 |
| Total Endocrine (EN) HI across All Media = | 0.008 |
| Total Gastrointestinal (GI) HI across All Media = | 0.008 |
| Total Nervous (NV) HI across All Media = | 0.008 |
| Total Reproductive (RP) HI across All Media = | 0.00001 |
| Total Respiratory (RS) HI across All Media = | 0.0001 |

Table 9-10.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 2E-06 | 2E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-05 | 2E-05 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 2E-05 | 2E-05 | -- | 4E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 4E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 4E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 8E-10 | 8E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-08 | 1E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-08 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-08 | | | | | -- |
| Medium Total | | | | | | | 4E-05 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 4E-05 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-11.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 5E-07 | 6E-08 | -- | 5E-07 | HM; IM | 0.006 | 0.0008 | -- | 0.007 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.01 | 0.002 | -- | 0.02 |
| | | | Benzene | 3E-08 | 6E-11 | -- | 3E-08 | IM | 0.0003 | 0.0000007 | -- | 0.0003 |
| | | | Ethylbenzene | 3E-08 | 3E-09 | -- | 3E-08 | HP; UR | 0.00007 | 0.000008 | -- | 0.00008 |
| | | | Naphthalene | 1E-07 | 1E-08 | -- | 1E-07 | OT | 0.0001 | 0.00002 | -- | 0.0001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00008 | 0.00001 | -- | 0.00009 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 2E-07 | 1E-07 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 7E-06 | 4E-06 | -- | 1E-05 | DV | 0.07 | 0.04 | -- | 0.1 |
| | | | Benzo(b)fluoranthene | 2E-07 | 1E-07 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-07 | 7E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 1E-07 | 8E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 8E-09 | 3E-09 | -- | 1E-08 | HP | 0.003 | 0.001 | -- | 0.004 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-06 | 1E-07 | -- | 1E-06 | RP | 0.03 | 0.004 | -- | 0.04 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.0006 | -- | 0.01 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.2 | 0.05 | -- | 0.2 |
| | | | Arsenic | 3E-06 | 6E-07 | -- | 3E-06 | CV; DM | 0.02 | 0.004 | -- | 0.02 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.02 | 0.003 | -- | 0.02 |
| | | | Chromium, Total | 8E-06 | 1E-05 | -- | 2E-05 | NA | 0.02 | 0.03 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.02 | 0.0008 | -- | 0.02 |
| | | | Copper | -- | -- | -- | -- | GI | 0.06 | 0.003 | -- | 0.06 |
| | | | Iron | -- | -- | -- | -- | GI | 0.07 | 0.003 | -- | 0.07 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.02 | 0.02 | -- | 0.04 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.004 | 0.003 | -- | 0.007 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.02 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.004 | 0.004 | -- | 0.007 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.0003 | -- | 0.008 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.004 | 0.006 | -- | 0.009 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.005 | 0.0002 | -- | 0.006 |
| | | | Chemical Total | 2E-05 | 2E-05 | -- | 4E-05 | | 0.6 | 0.2 | -- | 0.8 |
| | | Exposure Point Total | | | | | 4E-05 | | | | | 0.8 |
| | Exposure Medium Total | | | | | | 4E-05 | | | | | 0.8 |

Table 9-11.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-11 | 3E-11 | RS | -- | -- | 0.00002 | 0.00002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 8E-13 | 8E-13 | IM | -- | -- | 0.000000009 | 0.000000009 |
| | | | Ethylbenzene | -- | -- | 1E-12 | 1E-12 | DV | -- | -- | 0.000000001 | 0.000000001 |
| | | | Naphthalene | -- | -- | 6E-12 | 6E-12 | NV; RS | -- | -- | 0.0000002 | 0.0000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000003 | 0.00000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 8E-10 | 8E-10 | DV | -- | -- | 0.002 | 0.002 |
| | | | Benzo(b)fluoranthene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 4E-13 | 4E-13 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 6E-11 | 6E-11 | -- | -- | -- | 0.0000001 | 0.0000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0006 | 0.0006 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00005 | 0.00005 |
| | | | Arsenic | -- | -- | 3E-09 | 3E-09 | CV; DM; DV; NV; RP; RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cadmium (Diet) | -- | -- | 2E-09 | 2E-09 | UR | -- | -- | 0.0003 | 0.0003 |
| | | | Chromium, Total | -- | -- | 4E-08 | 4E-08 | RS | -- | -- | 0.001 | 0.001 |
| | | | Cobalt | -- | -- | 4E-09 | 4E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Nickel | -- | -- | 8E-09 | 8E-09 | RS | -- | -- | 0.0009 | 0.0009 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 6E-08 | 6E-08 | | -- | -- | 0.007 | 0.007 |
| | | Exposure Point Total | | | | | 6E-08 | | | | | 0.007 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-11.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-06 | 3E-06 | RS | -- | -- | 3 | 3 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.03 | 0.03 |
| | | | Benzene | -- | -- | 2E-07 | 2E-07 | IM | -- | -- | 0.002 | 0.002 |
| | | | Ethylbenzene | -- | -- | 2E-07 | 2E-07 | DV | -- | -- | 0.0002 | 0.0002 |
| | | | Naphthalene | -- | -- | 1E-07 | 1E-07 | NV; RS | -- | -- | 0.003 | 0.003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.004 | 0.004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | 0.00003 | 0.00003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.008 | 0.008 |
| | | | Chemical Total | -- | -- | 4E-06 | 4E-06 | | -- | -- | 3 | 3 |
| | | Exposure Point Total | | | | | 4E-06 | | | | | 3.000 |
| | Exposure Medium Total | | | | | | 4E-06 | | | | | 3 |
| Medium Total | | | | | | | 4E-05 | | | | | 4 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 4E-11 | 4E-11 | NV | -- | -- | 0.0000006 | 0.0000006 |
| | | | Benzene | -- | -- | 4E-09 | 4E-09 | IM | -- | -- | 0.00005 | 0.00005 |
| | | | Chloroform | -- | -- | 2E-11 | 2E-11 | HP | -- | -- | 0.00000003 | 0.00000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000004 | 0.0000004 |
| | | | Naphthalene | -- | -- | 9E-10 | 9E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 3E-12 | 3E-12 | NV | -- | -- | 0.0000007 | 0.0000007 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Trichloroethene | -- | -- | 8E-12 | 8E-12 | DV; IM | -- | -- | 0.000003 | 0.000003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000003 | 0.000003 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000006 | 0.000006 |
| | | | Benzo(a)anthracene | -- | -- | 2E-14 | 2E-14 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | 0.00000006 | 0.00000006 |

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Reasonable Maximum Exposure (Central/Southern)
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Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk (1) | | | | Non-Carcinogenic Hazard Quotient (1) | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Chemical Total | -- | -- | 7E-09 | 7E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 7E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 7E-09 | | | | | 0.0001 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 2E-06 | 2E-06 | NV | -- | -- | 0.03 | 0.03 |
| | | | Benzene | -- | -- | 3E-04 | 3E-04 | IM | -- | -- | 4 | 4 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.1 | 0.1 |
| | | | Ethylbenzene | -- | -- | 9E-05 | 9E-05 | DV | -- | -- | 0.1 | 0.1 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.02 | 0.02 |
| | | | Naphthalene | -- | -- | 6E-06 | 6E-06 | NV; RS | -- | -- | 0.2 | 0.2 |
| | | | Tetrachloroethene | -- | -- | 2E-07 | 2E-07 | NV | -- | -- | 0.06 | 0.06 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Trichloroethene | -- | -- | 5E-07 | 5E-07 | DV; IM | -- | -- | 0.2 | 0.2 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 3 | 3 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.04 | 0.04 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.08 | 0.08 |
| | | | Chemical Total | -- | -- | 4E-04 | 4E-04 | | -- | -- | 7 | 7 |
| | | Exposure Point Total | | | | | 4E-04 | | | | | 7 |
| | Exposure Medium Total | | | | | | 4E-04 | | | | | 7 |
| Medium Total | | | | | | | 4E-04 | | | | | 7 |
| Notes: | | | | | | Receptor Risk Total | 4E-04 | | | | Receptor Hazard Index (HI) | 11 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.02 |
| Total Dermal (DM) HI across All Media = | 0.04 |
| Total Developmental (DV) HI across All Media = | 0.5 |
| Total Endocrine (EN) HI across All Media = | 0.04 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.2 |
| Total Hepatic (HP) HI across All Media = | 0.04 |
| Total Immune (IM) HI across All Media = | 4 |
| Total Nervous (NV) HI across All Media = | 4 |
| Total Other (OT) HI across All Media = | 0.3 |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.04 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 3 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.06 |

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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 6E-08 | 6E-09 | -- | 7E-08 | HP | 0.02 | 0.002 | -- | 0.02 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.05 | 0.005 | -- | 0.05 |
| | | | Benzene | 4E-09 | 6E-12 | -- | 4E-09 | HM | 0.0005 | 0.0000007 | -- | 0.0005 |
| | | | Ethylbenzene | 3E-09 | 3E-10 | -- | 4E-09 | HP | 0.0004 | 0.00004 | -- | 0.0005 |
| | | | Naphthalene | 1E-08 | 1E-09 | -- | 2E-08 | NV | 0.00001 | 0.000001 | -- | 0.00002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0001 | 0.00001 | -- | 0.0001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 3E-08 | 1E-08 | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 9E-07 | 4E-07 | -- | 1E-06 | DV | 0.2 | 0.09 | -- | 0.3 |
| | | | Benzo(b)fluoranthene | 3E-08 | 1E-08 | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 2E-08 | 7E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 2E-08 | 8E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 1E-09 | 3E-10 | -- | 1E-09 | HP | 0.01 | 0.003 | -- | 0.01 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-07 | 1E-08 | -- | 1E-07 | IM | 0.004 | 0.0004 | -- | 0.004 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.05 | 0.002 | -- | 0.05 |
| | | | Antimony | -- | -- | -- | -- | OT | 0.6 | 0.1 | -- | 0.7 |
| | | | Arsenic | 4E-07 | 6E-08 | -- | 4E-07 | DM | 0.003 | 0.0005 | -- | 0.004 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | MS | 0.1 | 0.01 | -- | 0.1 |
| | | | Chromium, Total | 1E-06 | 1E-06 | -- | 2E-06 | HM | 0.03 | 0.04 | -- | 0.07 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.006 | 0.0002 | -- | 0.006 |
| | | | Copper | -- | -- | -- | -- | GI | 0.7 | 0.02 | -- | 0.7 |
| | | | Iron | -- | -- | -- | -- | GI | 0.2 | 0.007 | -- | 0.2 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.07 | 0.05 | -- | 0.1 |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | OT | 0.07 | 0.06 | -- | 0.1 |
| | | | Silver | -- | -- | -- | -- | DM | 0.01 | 0.009 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.006 | 0.0002 | -- | 0.006 |
| | | | Vanadium | -- | -- | -- | -- | HM | 0.006 | 0.007 | -- | 0.01 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.02 | 0.0006 | -- | 0.02 |
| | | | Chemical Total | 3E-06 | 2E-06 | -- | 5E-06 | | 2 | 0.4 | -- | 3 |
| | | Exposure Point Total | | | | | 5E-06 | | | | | 3 |
| | Exposure Medium Total | | | | | | 5E-06 | | | | | 3 |

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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 1E-10 | 1E-10 | RS | -- | -- | 0.0003 | 0.0003 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Benzene | -- | -- | 4E-12 | 4E-12 | HM | -- | -- | 0.0000004 | 0.0000004 |
| | | | Ethylbenzene | -- | -- | 6E-12 | 6E-12 | OT | -- | -- | 0.00000002 | 0.00000002 |
| | | | Naphthalene | -- | -- | 3E-11 | 3E-11 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 0.000001 | 0.000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 4E-09 | 4E-09 | DV | -- | -- | 0.2 | 0.2 |
| | | | Benzo(b)fluoranthene | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 7E-11 | 7E-11 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 9E-11 | 9E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.07 | 0.07 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.002 | 0.002 |
| | | | Arsenic | -- | -- | 1E-08 | 1E-08 | CV; DM; DV; NV; RP; RS | -- | -- | 0.01 | 0.01 |
| | | | Cadmium (Diet) | -- | -- | 1E-08 | 1E-08 | UR | -- | -- | 0.0005 | 0.0005 |
| | | | Chromium, Total | -- | -- | 2E-07 | 2E-07 | RS | -- | -- | 0.004 | 0.004 |
| | | | Cobalt | -- | -- | 2E-08 | 2E-08 | RS | -- | -- | 0.007 | 0.007 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Nickel | -- | -- | 4E-08 | 4E-08 | RS | -- | -- | 0.05 | 0.05 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 3E-07 | 3E-07 | | -- | -- | 0.6 | 0.6 |
| | | Exposure Point Total | | | | | 3E-07 | | | | | 0.6 |
| | | Vapors above Site | | | | | | | | | | |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 8E-07 | 8E-07 | RS | -- | -- | 2 | 2 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Benzene | -- | -- | 4E-08 | 4E-08 | HM | -- | -- | 0.005 | 0.005 |
| | | | Ethylbenzene | -- | -- | 4E-08 | 4E-08 | OT | -- | -- | 0.0001 | 0.0001 |
| | | | Naphthalene | -- | -- | 2E-08 | 2E-08 | NV; RS | -- | -- | 0.02 | 0.02 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 0.006 | 0.006 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.05 | 0.05 |
| | | | Chemical Total | -- | -- | 9E-07 | 9E-07 | | -- | -- | 2 | 2 |
| | | Exposure Point Total | | | | | 9E-07 | | | | | 2.000 |
| | Exposure Medium Total | | | | | | 1E-06 | | | | | 3 |
| Medium Total | | | | | | | 6E-06 | | | | | 5 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 2E-10 | 6E-10 | -- | 8E-10 | UR | 0.000007 | 0.00002 | -- | 0.00003 |
| | | | Benzene | 2E-08 | 2E-07 | -- | 2E-07 | HM | 0.003 | 0.03 | -- | 0.03 |
| | | | Chloroform | 3E-11 | 2E-10 | -- | 2E-10 | HP | 0.0000006 | 0.000004 | -- | 0.000004 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.00004 | 0.0003 | -- | 0.0003 |
| | | | Ethylbenzene | 5E-09 | 2E-07 | -- | 2E-07 | HP | 0.0006 | 0.02 | -- | 0.02 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.000008 | 0.0005 | -- | 0.0005 |
| | | | Naphthalene | 9E-09 | 3E-07 | -- | 3E-07 | NV | 0.000008 | 0.0003 | -- | 0.0003 |
| | | | Tetrachloroethene | 1E-11 | 3E-10 | -- | 4E-10 | NV | 0.00005 | 0.001 | -- | 0.002 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.0001 | 0.003 | -- | 0.003 |
| | | | Trichloroethene | 5E-11 | 5E-10 | -- | 6E-10 | DV; IM | 0.0002 | 0.002 | -- | 0.002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0003 | 0.01 | -- | 0.01 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 1E-11 | 1E-09 | -- | 1E-09 | DV | 0.000001 | 0.0001 | -- | 0.0001 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.0004 | 0.03 | -- | 0.03 |
| | | | Benzo(a)anthracene | 2E-11 | -- | -- | 2E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 2E-10 | -- | -- | 2E-10 | DV | 0.00004 | -- | -- | 0.00004 |
| | | | Benzo(b)fluoranthene | 2E-11 | -- | -- | 2E-11 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.00001 | 0.0009 | -- | 0.001 |

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| Scenario Timeframe: | Future |
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| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-09 | -- | -- | 3E-09 | IM | 0.00009 | -- | -- | 0.00009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.0009 | 0.0006 | -- | 0.001 |
| | | | Antimony | -- | -- | -- | -- | OT | 0.0002 | 0.001 | -- | 0.001 |
| | | | Arsenic | 2E-08 | 1E-08 | -- | 3E-08 | DM | 0.0001 | 0.0001 | -- | 0.0002 |
| | | | Barium | -- | -- | -- | -- | UR | 0.00002 | 0.0002 | -- | 0.0003 |
| | | | Beryllium | -- | -- | -- | -- | -- | 0.0001 | 0.01 | -- | 0.01 |
| | | | Cadmium (Water) | -- | -- | -- | -- | MS | 0.0001 | 0.002 | -- | 0.002 |
| | | | Chromium, Total | 8E-09 | 4E-07 | -- | 4E-07 | HM | 0.0002 | 0.01 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0002 | 0.00006 | -- | 0.0003 |
| | | | Iron | -- | -- | -- | -- | GI | 0.002 | 0.001 | -- | 0.003 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.003 | 0.05 | -- | 0.05 |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | DM | 0.003 | 0.002 | -- | 0.005 |
| | | | Vanadium | -- | -- | -- | -- | HM | 0.0001 | 0.003 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.00003 | 0.00001 | -- | 0.00004 |
| | | | Chemical Total | 6E-08 | 1E-06 | -- | 1E-06 | | 0.01 | 0.2 | -- | 0.2 |
| | | Exposure Point Total | | | | | 1E-06 | | | | | 0.2 |
| | Exposure Medium Total | | | | | | 1E-06 | | | | | 0.2 |
| | Outdoor Air | Trench (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 3E-07 | 3E-07 | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | 2E-05 | 2E-05 | HM | -- | -- | 2 | 2 |
| | | | Chloroform | -- | -- | 1E-07 | 1E-07 | HP | -- | -- | 0.001 | 0.001 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 6E-06 | 6E-06 | OT | -- | -- | 0.02 | 0.02 |
| | | | Isopropylbenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.2 | 0.2 |
| | | | Naphthalene | -- | -- | 1E-05 | 1E-05 | NV; RS | -- | -- | 7 | 7 |
| | | | Tetrachloroethene | -- | -- | 6E-09 | 6E-09 | NV | -- | -- | 0.04 | 0.04 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Trichloroethene | -- | -- | 2E-08 | 2E-08 | DV; IM | -- | -- | 0.2 | 0.2 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 1 | 1 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.1 | 0.1 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |

Table 9-12.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-06 | 2E-06 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Chemical Total | -- | -- | 4E-05 | 4E-05 | | -- | -- | 11 | 11 |
| | | Exposure Point Total | | | | | 4E-05 | | | | | 11 |
| | Exposure Medium Total | | | | | | 4E-05 | | | | | 11 |
| Medium Total | | | | | | | 4E-05 | | | | | 11 |
| Notes: | | | | | | Receptor Risk Total | 4E-05 | | | | Receptor Hazard Index (HI) | 16 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.01 |
| Total Dermal (DM) HI across All Media = | 0.05 |
| Total Developmental (DV) HI across All Media = | 0.8 |
| Total Endocrine (EN) HI across All Media = | 0.007 |
| Total Gastrointestinal (GI) HI across All Media = | 0.9 |
| Total Hematological (HM) HI across All Media = | 2 |
| Total Hepatic (HP) HI across All Media = | 0.2 |
| Total Immune (IM) HI across All Media = | 0.2 |
| Total Musculoskeletal (MS) HI across All Media = | 0.1 |
| Total Nervous (NV) HI across All Media = | 8 |
| Total Other (OT) HI across All Media = | 2 |
| Total Reproductive (RP) HI across All Media = | 0.01 |
| Total Respiratory (RS) HI across All Media = | 9 |
| Total Urinary (UR) HI across All Media = | 0.1 |

Table 9-13.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.09 | 0.006 | -- | 0.1 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.2 | 0.02 | -- | 0.2 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.005 | 0.000006 | -- | 0.005 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.001 | 0.00007 | -- | 0.001 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.002 | 0.0001 | -- | 0.002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.001 | 0.00009 | -- | 0.001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 1 | 0.3 | -- | 1 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.04 | 0.01 | -- | 0.06 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.5 | 0.03 | -- | 0.5 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.2 | 0.005 | -- | 0.2 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 3 | 0.4 | -- | 3 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.2 | 0.03 | -- | 0.3 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.3 | 0.02 | -- | 0.3 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.2 | 0.2 | -- | 0.4 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.3 | 0.007 | -- | 0.3 |
| | | | Copper | -- | -- | -- | -- | GI | 0.9 | 0.02 | -- | 0.9 |
| | | | Iron | -- | -- | -- | -- | GI | 1 | 0.02 | -- | 1 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.3 | 0.2 | -- | 0.5 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.06 | 0.02 | -- | 0.08 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.3 | 0.2 | -- | 0.5 |
| | | | Silver | -- | -- | -- | -- | DM | 0.05 | 0.03 | -- | 0.08 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.1 | 0.003 | -- | 0.1 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.05 | 0.05 | -- | 0.1 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.08 | 0.002 | -- | 0.08 |
| | | | Chemical Total | -- | -- | -- | -- | | 9 | 2 | -- | 10 |
| | | Exposure Point Total | | | | | -- | | | | | 10 |
| | Exposure Medium Total | | | | | | -- | | | | | 10 |

Table 9-13.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.000002 | 0.000002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.00000004 | 0.00000004 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.000000006 | 0.000000006 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.0000007 | 0.0000007 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.0000001 | 0.0000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.008 | 0.008 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.0000005 | 0.0000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.0005 | 0.0005 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.001 | 0.001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.005 | 0.005 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.0008 | 0.0008 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.008 | 0.008 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.000002 | 0.000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.004 | 0.004 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.03 | 0.03 |
| | | Exposure Point Total | | | | | -- | | | | | 0.03 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-13.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 11 | 11 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.009 | 0.009 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.0008 | 0.0008 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.01 | 0.01 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.02 | 0.02 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.0001 | 0.0001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.03 | 0.03 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 11 | 11 |
| | | Exposure Point Total | | | | | -- | | | | | 11.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 12 |
| Medium Total | | | | | | | -- | | | | | 22 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.01 | 0.0005 | -- | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | 4 | 0.5 | -- | 4 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.004 | 0.0003 | -- | 0.004 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.2 | 0.02 | -- | 0.2 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.2 | 0.09 | -- | 0.3 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.02 | 0.02 | -- | 0.04 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.1 | 0.08 | -- | 0.2 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.03 | 0.02 | -- | 0.05 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.7 | 0.2 | -- | 0.9 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.09 | 0.01 | -- | 0.1 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.3 | 0.2 | -- | 0.5 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.0001 | 0.0002 | -- | 0.0003 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.2 | 0.3 | -- | 0.5 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.02 | -- | -- | 0.02 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.02 | 0.04 | -- | 0.06 |

Table 9-13.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 1 | -- | -- | 1 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.5 | 0.002 | -- | 0.5 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.1 | 0.004 | -- | 0.1 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 1 | 0.006 | -- | 1 |
| | | | Barium | -- | -- | -- | -- | NV | 0.01 | 0.0008 | -- | 0.01 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.1 | 0.09 | -- | 0.2 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.07 | 0.006 | -- | 0.07 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.2 | 0.07 | -- | 0.3 |
| | | | Cobalt | -- | -- | -- | -- | EN | 1 | 0.002 | -- | 1 |
| | | | Iron | -- | -- | -- | -- | GI | 1 | 0.005 | -- | 1 |
| | | | Manganese | -- | -- | -- | -- | NV | 2 | 0.2 | -- | 2 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.04 | 0.003 | -- | 0.04 |
| | | | Thallium | -- | -- | -- | -- | DM | 6 | 0.03 | -- | 7 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.1 | 0.02 | -- | 0.1 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.02 | 0.00005 | -- | 0.02 |
| | | | Chemical Total | -- | -- | -- | -- | | 20 | 2 | -- | 22 |
| | | Exposure Point Total | | | | | -- | | | | | 22 |
| | Exposure Medium Total | | | | | | -- | | | | | 22 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |

Table 9-13.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 53 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 75 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 2 |
| Total Dermal (DM) HI across All Media = | 9 |
| Total Developmental (DV) HI across All Media = | 3 |
| Total Endocrine (EN) HI across All Media = | 2 |
| Total Gastrointestinal (GI) HI across All Media = | 3 |
| Total Hematological (HM) HI across All Media = | 3 |
| Total Hepatic (HP) HI across All Media = | 0.5 |
| Total Immune (IM) HI across All Media = | 20 |
| Total Nervous (NV) HI across All Media = | 18 |
| Total Other (OT) HI across All Media = | 4 |
| Total Reproductive (RP) HI across All Media = | 2 |
| Total Respiratory (RS) HI across All Media = | 12 |
| Total Urinary (UR) HI across All Media = | 2 |

Table 9-14.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.008 | 0.001 | -- | 0.009 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.02 | 0.003 | -- | 0.02 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.0005 | 0.000001 | -- | 0.0005 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.00009 | 0.00001 | -- | 0.0001 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.0002 | 0.00002 | -- | 0.0002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0001 | 0.00001 | -- | 0.0001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.09 | 0.05 | -- | 0.1 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.004 | 0.002 | -- | 0.006 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.04 | 0.006 | -- | 0.05 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.02 | 0.0008 | -- | 0.02 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.2 | 0.07 | -- | 0.3 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.02 | 0.005 | -- | 0.03 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.02 | 0.004 | -- | 0.03 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.02 | 0.04 | -- | 0.06 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.03 | 0.001 | -- | 0.03 |
| | | | Copper | -- | -- | -- | -- | GI | 0.09 | 0.004 | -- | 0.09 |
| | | | Iron | -- | -- | -- | -- | GI | 0.1 | 0.004 | -- | 0.1 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.03 | 0.03 | -- | 0.06 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.006 | 0.004 | -- | 0.009 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.03 | 0.03 | -- | 0.06 |
| | | | Silver | -- | -- | -- | -- | DM | 0.005 | 0.005 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.01 | 0.0004 | -- | 0.01 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.005 | 0.008 | -- | 0.01 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.008 | 0.0003 | -- | 0.008 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.8 | 0.3 | -- | 1 |
| | | Exposure Point Total | | | | | -- | | | | | 1 |
| | Exposure Medium Total | | | | | | -- | | | | | 1 |

Table 9-14.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.000002 | 0.000002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.00000004 | 0.00000004 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.000000006 | 0.000000006 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.0000007 | 0.0000007 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.0000001 | 0.0000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.008 | 0.008 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.0000005 | 0.0000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.0005 | 0.0005 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.001 | 0.001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.005 | 0.005 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.0008 | 0.0008 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.008 | 0.008 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.000002 | 0.000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.004 | 0.004 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.03 | 0.03 |
| | | Exposure Point Total | | | | | -- | | | | | 0.03 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-14.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 11 | 11 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.009 | 0.009 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.0008 | 0.0008 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.01 | 0.01 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.02 | 0.02 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.0001 | 0.0001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.03 | 0.03 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 11 | 11 |
| | | Exposure Point Total | | | | | -- | | | | | 11.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 12 |
| Medium Total | | | | | | | -- | | | | | 13 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.007 | 0.0004 | -- | 0.008 |
| | | | Benzene | -- | -- | -- | -- | IM | 2 | 0.3 | -- | 2 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.002 | 0.0002 | -- | 0.002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.1 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.1 | 0.06 | -- | 0.2 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.01 | 0.01 | -- | 0.02 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.08 | 0.05 | -- | 0.1 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.02 | 0.01 | -- | 0.03 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.4 | 0.1 | -- | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.05 | 0.009 | -- | 0.06 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.2 | 0.1 | -- | 0.3 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00008 | 0.0001 | -- | 0.0002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.1 | 0.2 | -- | 0.3 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.01 | -- | -- | 0.01 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.01 | 0.02 | -- | 0.04 |

Table 9-14.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.9 | -- | -- | 0.9 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.3 | 0.002 | -- | 0.3 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.07 | 0.003 | -- | 0.08 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.8 | 0.004 | -- | 0.8 |
| | | | Barium | -- | -- | -- | -- | NV | 0.008 | 0.0006 | -- | 0.009 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.08 | 0.07 | -- | 0.2 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.04 | 0.005 | -- | 0.04 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.1 | 0.06 | -- | 0.2 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.7 | 0.002 | -- | 0.7 |
| | | | Iron | -- | -- | -- | -- | GI | 0.6 | 0.004 | -- | 0.6 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.9 | 0.1 | -- | 1 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.02 | 0.002 | -- | 0.03 |
| | | | Thallium | -- | -- | -- | -- | DM | 4 | 0.02 | -- | 4 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.06 | 0.01 | -- | 0.08 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.01 | 0.00004 | -- | 0.01 |
| | | | Chemical Total | -- | -- | -- | -- | | 12 | 1 | -- | 13 |
| | | Exposure Point Total | | | | | -- | | | | | 13 |
| | Exposure Medium Total | | | | | | -- | | | | | 13 |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.01 | 0.01 |
| | | | Chloroform | -- | -- | -- | -- | HP | -- | -- | 0.000008 | 0.000008 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.0004 | 0.0004 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0001 | 0.0001 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.01 | 0.01 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.0005 | 0.0005 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.002 | 0.002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.004 | 0.004 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-14.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00007 | 0.00007 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.05 | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 45 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 57 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.8 |
| Total Dermal (DM) HI across All Media = | 5 |
| Total Developmental (DV) HI across All Media = | 2 |
| Total Endocrine (EN) HI across All Media = | 0.9 |
| Total Gastrointestinal (GI) HI across All Media = | 1 |
| Total Hematological (HM) HI across All Media = | 0.4 |
| Total Hepatic (HP) HI across All Media = | 0.3 |
| Total Immune (IM) HI across All Media = | 18 |

Table 9-14.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 16 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.9 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.9 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 12 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 1 |

Table 9-15.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 2E-06 | 2E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | 1E-07 | 2E-10 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 1E-07 | 1E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Naphthalene | 5E-07 | 4E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 4E-06 | 1E-06 | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 2E-04 | 5E-05 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 4E-06 | 1E-06 | -- | 6E-06 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 3E-06 | 8E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 3E-06 | 1E-06 | -- | 4E-06 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 4E-08 | 1E-08 | -- | 5E-08 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 5E-06 | 4E-07 | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 1E-05 | 2E-06 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-04 | 2E-04 | -- | 4E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 4E-04 | 2E-04 | -- | 6E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 6E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 6E-04 | | | | | -- |

Table 9-15.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 5E-07 | 5E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 5E-07 | | | | | -- |
| | | Vapors above Site | | | | | | | | | | |

Table 9-15.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 1E-05 | 1E-05 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 8E-07 | 8E-07 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 7E-07 | 7E-07 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 4E-07 | 4E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-08 | 7E-08 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-05 | 2E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-05 | | | | | -- |
| Medium Total | | | | | | | 6E-04 | | | | | -- |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 2E-06 | 8E-08 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | 2E-04 | 3E-05 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | Chloroform | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 5E-05 | 3E-05 | -- | 8E-05 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | 9E-05 | 5E-05 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | 1E-07 | 6E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | 8E-07 | 1E-07 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 1E-07 | 2E-07 | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 6E-07 | -- | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 5E-06 | -- | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 5E-07 | -- | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-15.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-05 | -- | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 2E-04 | 8E-07 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | Barium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Beryllium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cadmium (Water) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-04 | 1E-04 | -- | 4E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 8E-04 | 2E-04 | -- | 1E-03 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-03 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-03 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 8E-07 | 8E-07 | -- | -- | -- | -- | -- |
| | | | Chloroform | -- | -- | 5E-09 | 5E-09 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-07 | 3E-07 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 4E-07 | 4E-07 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |

Table 9-15.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk (1) | | | | Non-Carcinogenic Hazard Quotient (1) | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-06 | 2E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-06 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 8E-06 | 8E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 1E-03 | 1E-03 | -- | -- | -- | -- | -- |
| | | | Cyclohexane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 4E-04 | 4E-04 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 3E-05 | 3E-05 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 9E-07 | 9E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 3E-06 | 3E-06 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-03 | 2E-03 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-03 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-03 | | | | | -- |
| Medium Total | | | | | | | 3E-03 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 3E-03 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-16.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.0004 | -- | 0.01 |
| | | | Arsenic | 7E-07 | 1E-07 | -- | 8E-07 | CV; DM | 0.004 | 0.0009 | -- | 0.005 |
| | | | Chromium, Total | 2E-06 | 3E-06 | -- | 4E-06 | NA | 0.003 | 0.005 | -- | 0.008 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.01 | 0.0004 | -- | 0.01 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.0005 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.009 | 0.0004 | -- | 0.01 |
| | | | Chemical Total | 2E-06 | 3E-06 | -- | 5E-06 | | 0.05 | 0.008 | -- | 0.05 |
| | | Exposure Point Total | | | | | 5E-06 | | | | | 0.05 |
| | Exposure Medium Total | | | | | | 5E-06 | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0004 | 0.0004 |
| | | | Arsenic | -- | -- | 6E-10 | 6E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | 8E-09 | 8E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-08 | 1E-08 | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | 1E-08 | | | | | 0.0007 |
| | Exposure Medium Total | | | | | | 1E-08 | | | | | 0.0007 |
| Medium Total | | | | | | | 5E-06 | | | | | 0.06 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 4E-11 | 4E-11 | NV | -- | -- | 0.0000006 | 0.0000006 |
| | | | Benzene | -- | -- | 4E-09 | 4E-09 | IM | -- | -- | 0.00005 | 0.00005 |
| | | | Chloroform | -- | -- | 2E-11 | 2E-11 | HP | -- | -- | 0.00000003 | 0.00000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000004 | 0.0000004 |
| | | | Naphthalene | -- | -- | 9E-10 | 9E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 3E-12 | 3E-12 | NV | -- | -- | 0.0000007 | 0.0000007 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Trichloroethene | -- | -- | 8E-12 | 8E-12 | DV; IM | -- | -- | 0.000003 | 0.000003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |

Table 9-16.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000003 | 0.000003 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000006 | 0.000006 |
| | | | Benzo(a)anthracene | -- | -- | 2E-14 | 2E-14 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | 0.00000006 | 0.00000006 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Chemical Total | -- | -- | 7E-09 | 7E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 7E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 7E-09 | | | | | 0.0001 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 2E-06 | 2E-06 | NV | -- | -- | 0.03 | 0.03 |
| | | | Benzene | -- | -- | 3E-04 | 3E-04 | IM | -- | -- | 4 | 4 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.1 | 0.1 |
| | | | Ethylbenzene | -- | -- | 9E-05 | 9E-05 | DV | -- | -- | 0.1 | 0.1 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.02 | 0.02 |
| | | | Naphthalene | -- | -- | 6E-06 | 6E-06 | NV; RS | -- | -- | 0.2 | 0.2 |
| | | | Tetrachloroethene | -- | -- | 2E-07 | 2E-07 | NV | -- | -- | 0.06 | 0.06 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Trichloroethene | -- | -- | 5E-07 | 5E-07 | DV; IM | -- | -- | 0.2 | 0.2 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 3 | 3 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.04 | 0.04 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.08 | 0.08 |
| | | | Chemical Total | -- | -- | 4E-04 | 4E-04 | | -- | -- | 7 | 7 |
| | | Exposure Point Total | | | | | 4E-04 | | | | | 7 |
| | Exposure Medium Total | | | | | | 4E-04 | | | | | 7 |
| Medium Total | | | | | | | 4E-04 | | | | | 7 |
| | | | | | | Receptor Risk Total | 4E-04 | | | | Receptor Hazard Index (HI) | 8 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.005 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.4 |

Table 9-16.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Endocrine (EN) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 0.01 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.04 |
| | | | | | | | | | Total Immune (IM) HI across All Media = | | | 4 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 3 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.00003 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.2 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.04 |

Table 9-17.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.03 | 0.001 | -- | 0.03 |
| | | | Arsenic | 9E-08 | 1E-08 | -- | 1E-07 | DM | 0.0008 | 0.0001 | -- | 0.001 |
| | | | Chromium, Total | 2E-07 | 3E-07 | -- | 5E-07 | HM | 0.006 | 0.008 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.003 | 0.0001 | -- | 0.003 |
| | | | Iron | -- | -- | -- | -- | GI | 0.04 | 0.001 | -- | 0.04 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.008 | 0.0002 | -- | 0.008 |
| | | | Chemical Total | 3E-07 | 3E-07 | -- | 6E-07 | | 0.09 | 0.01 | -- | 0.1 |
| | | Exposure Point Total | | | | | 6E-07 | | | | | 0.1 |
| | Exposure Medium Total | | | | | | 6E-07 | | | | | 0.1 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.05 | 0.05 |
| | | | Arsenic | -- | -- | 3E-09 | 3E-09 | CV; DM; DV; NV; RP; RS | -- | -- | 0.004 | 0.004 |
| | | | Chromium, Total | -- | -- | 4E-08 | 4E-08 | RS | -- | -- | 0.0008 | 0.0008 |
| | | | Cobalt | -- | -- | 9E-09 | 9E-09 | RS | -- | -- | 0.004 | 0.004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 5E-08 | 5E-08 | | -- | -- | 0.06 | 0.06 |
| | | Exposure Point Total | | | | | 5E-08 | | | | | 0.06 |
| | Exposure Medium Total | | | | | | 5E-08 | | | | | 0.06 |
| Medium Total | | | | | | | 6E-07 | | | | | 0.2 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 2E-10 | 6E-10 | -- | 8E-10 | UR | 0.000007 | 0.00002 | -- | 0.00003 |
| | | | Benzene | 2E-08 | 2E-07 | -- | 2E-07 | HM | 0.003 | 0.03 | -- | 0.03 |
| | | | Chloroform | 3E-11 | 2E-10 | -- | 2E-10 | HP | 0.0000006 | 0.000004 | -- | 0.000004 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.00004 | 0.0003 | -- | 0.0003 |
| | | | Ethylbenzene | 5E-09 | 2E-07 | -- | 2E-07 | HP | 0.0006 | 0.02 | -- | 0.02 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.000008 | 0.0005 | -- | 0.0005 |
| | | | Naphthalene | 9E-09 | 3E-07 | -- | 3E-07 | NV | 0.000008 | 0.0003 | -- | 0.0003 |
| | | | Tetrachloroethene | 1E-11 | 3E-10 | -- | 4E-10 | NV | 0.00005 | 0.001 | -- | 0.002 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.0001 | 0.003 | -- | 0.003 |
| | | | Trichloroethene | 5E-11 | 5E-10 | -- | 6E-10 | DV; IM | 0.0002 | 0.002 | -- | 0.002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0003 | 0.01 | -- | 0.01 |

Table 9-17.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 1E-11 | 1E-09 | -- | 1E-09 | DV | 0.000001 | 0.0001 | -- | 0.0001 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.0004 | 0.03 | -- | 0.03 |
| | | | Benzo(a)anthracene | 2E-11 | -- | -- | 2E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 2E-10 | -- | -- | 2E-10 | DV | 0.00004 | -- | -- | 0.00004 |
| | | | Benzo(b)fluoranthene | 2E-11 | -- | -- | 2E-11 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.00001 | 0.0009 | -- | 0.001 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-09 | -- | -- | 3E-09 | IM | 0.00009 | -- | -- | 0.00009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.0009 | 0.0006 | -- | 0.001 |
| | | | Antimony | -- | -- | -- | -- | OT | 0.0002 | 0.001 | -- | 0.001 |
| | | | Arsenic | 2E-08 | 1E-08 | -- | 3E-08 | DM | 0.0001 | 0.0001 | -- | 0.0002 |
| | | | Barium | -- | -- | -- | -- | UR | 0.00002 | 0.0002 | -- | 0.0003 |
| | | | Beryllium | -- | -- | -- | -- | -- | 0.0001 | 0.01 | -- | 0.01 |
| | | | Cadmium (Water) | -- | -- | -- | -- | MS | 0.0001 | 0.002 | -- | 0.002 |
| | | | Chromium, Total | 8E-09 | 4E-07 | -- | 4E-07 | HM | 0.0002 | 0.01 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0002 | 0.00006 | -- | 0.0003 |
| | | | Iron | -- | -- | -- | -- | GI | 0.002 | 0.001 | -- | 0.003 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.003 | 0.05 | -- | 0.05 |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | DM | 0.003 | 0.002 | -- | 0.005 |
| | | | Vanadium | -- | -- | -- | -- | HM | 0.0001 | 0.003 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.00003 | 0.00001 | -- | 0.00004 |
| | | | Chemical Total | 6E-08 | 1E-06 | -- | 1E-06 | | 0.01 | 0.2 | -- | 0.2 |
| | | Exposure Point Total | | | | | 1E-06 | | | | | 0.2 |
| | Exposure Medium Total | | | | | | 1E-06 | | | | | 0.2 |
| | Outdoor Air | Trench (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 3E-07 | 3E-07 | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | 2E-05 | 2E-05 | HM | -- | -- | 2 | 2 |
| | | | Chloroform | -- | -- | 1E-07 | 1E-07 | HP | -- | -- | 0.001 | 0.001 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 6E-06 | 6E-06 | OT | -- | -- | 0.02 | 0.02 |
| | | | Isopropylbenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.2 | 0.2 |
| | | | Naphthalene | -- | -- | 1E-05 | 1E-05 | NV; RS | -- | -- | 7 | 7 |
| | | | Tetrachloroethene | -- | -- | 6E-09 | 6E-09 | NV | -- | -- | 0.04 | 0.04 |

Table 9-17.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Trichloroethene | -- | -- | 2E-08 | 2E-08 | DV; IM | -- | -- | 0.2 | 0.2 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 1 | 1 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.1 | 0.1 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-06 | 2E-06 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Chemical Total | -- | -- | 4E-05 | 4E-05 | | -- | -- | 11 | 11 |
| | | Exposure Point Total | | | | | 4E-05 | | | | | 11 |
| | Exposure Medium Total | | | | | | 4E-05 | | | | | 11 |
| Medium Total | | | | | | | 4E-05 | | | | | 11 |
| Notes: | | | | | | Receptor Risk Total | 4E-05 | | | | Receptor Hazard Index (HI) | 11 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.004 |
| Total Dermal (DM) HI across All Media = | 0.02 |
| Total Developmental (DV) HI across All Media = | 0.2 |
| Total Endocrine (EN) HI across All Media = | 0.004 |
| Total Gastrointestinal (GI) HI across All Media = | 0.04 |
| Total Hematological (HM) HI across All Media = | 2 |
| Total Hepatic (HP) HI across All Media = | 0.1 |
| Total Immune (IM) HI across All Media = | 0.2 |
| Total Musculoskeletal (MS) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 8 |
| Total Other (OT) HI across All Media = | 1 |
| Total Reproductive (RP) HI across All Media = | 0.004 |
| Total Respiratory (RS) HI across All Media = | 7 |
| Total Urinary (UR) HI across All Media = | 0.1 |

Table 9-18.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.1 | 0.003 | -- | 0.2 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.06 | 0.008 | -- | 0.07 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.05 | 0.04 | -- | 0.09 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.1 | 0.003 | -- | 0.1 |
| | | | Iron | -- | -- | -- | -- | GI | 0.2 | 0.004 | -- | 0.2 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.1 | 0.003 | -- | 0.1 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.7 | 0.06 | -- | 0.8 |
| | | Exposure Point Total | | | | | -- | | | | | 0.8 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.8 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0009 | 0.0009 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.003 |
| Medium Total | | | | | | | -- | | | | | 0.8 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.01 | 0.0005 | -- | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | 4 | 0.5 | -- | 4 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.004 | 0.0003 | -- | 0.004 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.2 | 0.02 | -- | 0.2 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.2 | 0.09 | -- | 0.3 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.02 | 0.02 | -- | 0.04 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.1 | 0.08 | -- | 0.2 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.03 | 0.02 | -- | 0.05 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.7 | 0.2 | -- | 0.9 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.09 | 0.01 | -- | 0.1 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.3 | 0.2 | -- | 0.5 |

Table 9-18.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.0001 | 0.0002 | -- | 0.0003 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.2 | 0.3 | -- | 0.5 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.02 | -- | -- | 0.02 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.02 | 0.04 | -- | 0.06 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 1 | -- | -- | 1 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.5 | 0.002 | -- | 0.5 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.1 | 0.004 | -- | 0.1 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 1 | 0.006 | -- | 1 |
| | | | Barium | -- | -- | -- | -- | NV | 0.01 | 0.0008 | -- | 0.01 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.1 | 0.09 | -- | 0.2 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.07 | 0.006 | -- | 0.07 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.2 | 0.07 | -- | 0.3 |
| | | | Cobalt | -- | -- | -- | -- | EN | 1 | 0.002 | -- | 1 |
| | | | Iron | -- | -- | -- | -- | GI | 1 | 0.005 | -- | 1 |
| | | | Manganese | -- | -- | -- | -- | NV | 2 | 0.2 | -- | 2 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.04 | 0.003 | -- | 0.04 |
| | | | Thallium | -- | -- | -- | -- | DM | 6 | 0.03 | -- | 7 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.1 | 0.02 | -- | 0.1 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.02 | 0.00005 | -- | 0.02 |
| | | | Chemical Total | -- | -- | -- | -- | | 20 | 2 | -- | 22 |
| | | Exposure Point Total | | | | | -- | | | | | 22 |
| | Exposure Medium Total | | | | | | -- | | | | | 22 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |

Table 9-18.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 53 |
| | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 54 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 1 |
| Total Dermal (DM) HI across All Media = | 8 |
| Total Developmental (DV) HI across All Media = | 2 |
| Total Endocrine (EN) HI across All Media = | 1 |
| Total Gastrointestinal (GI) HI across All Media = | 1 |
| Total Hematological (HM) HI across All Media = | 0.1 |
| Total Hepatic (HP) HI across All Media = | 0.4 |
| Total Immune (IM) HI across All Media = | 20 |
| Total Nervous (NV) HI across All Media = | 17 |
| Total Other (OT) HI across All Media = | 0.9 |
| Total Reproductive (RP) HI across All Media = | 1 |
| Total Respiratory (RS) HI across All Media = | 1 |
| Total Urinary (UR) HI across All Media = | 2 |

Table 9-19.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.0006 | -- | 0.01 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.006 | 0.001 | -- | 0.007 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.004 | 0.007 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.01 | 0.0006 | -- | 0.01 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.0006 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.01 | 0.0006 | -- | 0.01 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.07 | 0.01 | -- | 0.08 |
| | | Exposure Point Total | | | | | -- | | | | | 0.08 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.08 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0009 | 0.0009 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.003 |
| Medium Total | | | | | | | -- | | | | | 0.08 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.007 | 0.0004 | -- | 0.008 |
| | | | Benzene | -- | -- | -- | -- | IM | 2 | 0.3 | -- | 2 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.002 | 0.0002 | -- | 0.002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.1 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.1 | 0.06 | -- | 0.2 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.01 | 0.01 | -- | 0.02 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.08 | 0.05 | -- | 0.1 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.02 | 0.01 | -- | 0.03 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.4 | 0.1 | -- | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.05 | 0.009 | -- | 0.06 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.2 | 0.1 | -- | 0.3 |

Table 9-19.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00008 | 0.0001 | -- | 0.0002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.1 | 0.2 | -- | 0.3 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.01 | -- | -- | 0.01 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.01 | 0.02 | -- | 0.04 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.9 | -- | -- | 0.9 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.3 | 0.002 | -- | 0.3 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.07 | 0.003 | -- | 0.08 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.8 | 0.004 | -- | 0.8 |
| | | | Barium | -- | -- | -- | -- | NV | 0.008 | 0.0006 | -- | 0.009 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.08 | 0.07 | -- | 0.2 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.04 | 0.005 | -- | 0.04 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.1 | 0.06 | -- | 0.2 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.7 | 0.002 | -- | 0.7 |
| | | | Iron | -- | -- | -- | -- | GI | 0.6 | 0.004 | -- | 0.6 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.9 | 0.1 | -- | 1 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.02 | 0.002 | -- | 0.03 |
| | | | Thallium | -- | -- | -- | -- | DM | 4 | 0.02 | -- | 4 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.06 | 0.01 | -- | 0.08 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.01 | 0.00004 | -- | 0.01 |
| | | | Chemical Total | -- | -- | -- | -- | | 12 | 1 | -- | 13 |
| | | Exposure Point Total | | | | | -- | | | | | 13 |
| | Exposure Medium Total | | | | | | -- | | | | | 13 |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.01 | 0.01 |
| | | | Chloroform | -- | -- | -- | -- | HP | -- | -- | 0.000008 | 0.000008 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.0004 | 0.0004 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0001 | 0.0001 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.01 | 0.01 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |

Table 9-19.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.0005 | 0.0005 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.002 | 0.002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.004 | 0.004 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00007 | 0.00007 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.05 | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 45 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 45 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.8 |

Table 9-19.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Dermal (DM) HI across All Media = | | | 5 |
| | | | | | | | | | Total Developmental (DV) HI across All Media = | | | 2 |
| | | | | | | | | | Total Endocrine (EN) HI across All Media = | | | 0.8 |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 0.8 |
| | | | | | | | | | Total Hematological (HM) HI across All Media = | | | 0.09 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.3 |
| | | | | | | | | | Total Immune (IM) HI across All Media = | | | 18 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 16 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.5 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.9 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 1 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 1 |

Table 9-20.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 3E-06 | 5E-07 | -- | 4E-06 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 3E-05 | 4E-05 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 4E-05 | 4E-05 | -- | 7E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 9E-08 | 9E-08 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-07 | 1E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-07 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-07 | | | | | -- |
| Medium Total | | | | | | | 7E-05 | | | | | -- |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 2E-06 | 8E-08 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | 2E-04 | 3E-05 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | Chloroform | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 5E-05 | 3E-05 | -- | 8E-05 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | 9E-05 | 5E-05 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | 1E-07 | 6E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | 8E-07 | 1E-07 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-20.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 1E-07 | 2E-07 | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 6E-07 | -- | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 5E-06 | -- | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 5E-07 | -- | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-05 | -- | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 2E-04 | 8E-07 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | Barium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Beryllium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cadmium (Water) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-04 | 1E-04 | -- | 4E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 8E-04 | 2E-04 | -- | 1E-03 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-03 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-03 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 8E-07 | 8E-07 | -- | -- | -- | -- | -- |
| | | | Chloroform | -- | -- | 5E-09 | 5E-09 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-07 | 3E-07 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 4E-07 | 4E-07 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |

Table 9-20.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk (1) | | | | Non-Carcinogenic Hazard Quotient (1) | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-06 | 2E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-06 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 8E-06 | 8E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 1E-03 | 1E-03 | -- | -- | -- | -- | -- |
| | | | Cyclohexane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 4E-04 | 4E-04 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 3E-05 | 3E-05 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 9E-07 | 9E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 3E-06 | 3E-06 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-03 | 2E-03 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-03 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-03 | | | | | -- |
| Medium Total | | | | | | | 3E-03 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 3E-03 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

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Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 4E-07 | 6E-08 | -- | 5E-07 | HM; IM | 0.005 | 0.0007 | -- | 0.006 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.01 | 0.002 | -- | 0.01 |
| | | | Benzene | 2E-08 | 5E-11 | -- | 2E-08 | IM | 0.0003 | 0.0000007 | -- | 0.0003 |
| | | | Ethylbenzene | 2E-08 | 3E-09 | -- | 3E-08 | HP; UR | 0.00006 | 0.000008 | -- | 0.00007 |
| | | | Naphthalene | 1E-07 | 1E-08 | -- | 1E-07 | OT | 0.0001 | 0.00001 | -- | 0.0001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00007 | 0.000009 | -- | 0.00008 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 2E-07 | 9E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 6E-06 | 3E-06 | -- | 1E-05 | DV | 0.06 | 0.03 | -- | 0.09 |
| | | | Benzo(b)fluoranthene | 2E-07 | 1E-07 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-07 | 6E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 1E-07 | 7E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 7E-09 | 3E-09 | -- | 1E-08 | HP | 0.003 | 0.001 | -- | 0.004 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 9E-07 | 1E-07 | -- | 1E-06 | RP | 0.03 | 0.004 | -- | 0.03 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.0005 | -- | 0.01 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.2 | 0.04 | -- | 0.2 |
| | | | Arsenic | 2E-06 | 5E-07 | -- | 3E-06 | CV; DM | 0.02 | 0.003 | -- | 0.02 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.02 | 0.003 | -- | 0.02 |
| | | | Chromium, Total | 7E-06 | 1E-05 | -- | 2E-05 | NA | 0.01 | 0.02 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.02 | 0.0007 | -- | 0.02 |
| | | | Copper | -- | -- | -- | -- | GI | 0.05 | 0.002 | -- | 0.06 |
| | | | Iron | -- | -- | -- | -- | GI | 0.06 | 0.003 | -- | 0.07 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.02 | 0.02 | -- | 0.04 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.004 | 0.002 | -- | 0.006 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.02 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.003 | 0.003 | -- | 0.007 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.0003 | -- | 0.007 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.003 | 0.005 | -- | 0.009 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.005 | 0.0002 | -- | 0.005 |
| | | | Chemical Total | 2E-05 | 2E-05 | -- | 4E-05 | | 0.5 | 0.2 | -- | 0.7 |
| | | Exposure Point Total | | | | | 4E-05 | | | | | 0.7 |
| | Exposure Medium Total | | | | | | 4E-05 | | | | | 0.7 |

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Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 2E-11 | 2E-11 | RS | -- | -- | 0.00002 | 0.00002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Benzene | -- | -- | 7E-13 | 7E-13 | IM | -- | -- | 0.000000008 | 0.000000008 |
| | | | Ethylbenzene | -- | -- | 1E-12 | 1E-12 | DV | -- | -- | 0.000000001 | 0.000000001 |
| | | | Naphthalene | -- | -- | 5E-12 | 5E-12 | NV; RS | -- | -- | 0.0000001 | 0.0000001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000003 | 0.00000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 7E-10 | 7E-10 | DV | -- | -- | 0.002 | 0.002 |
| | | | Benzo(b)fluoranthene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 4E-13 | 4E-13 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-11 | 5E-11 | -- | -- | -- | 0.0000001 | 0.0000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0005 | 0.0005 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Arsenic | -- | -- | 2E-09 | 2E-09 | CV; DM; DV; NV; RP; RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cadmium (Diet) | -- | -- | 2E-09 | 2E-09 | UR | -- | -- | 0.0003 | 0.0003 |
| | | | Chromium, Total | -- | -- | 3E-08 | 3E-08 | RS | -- | -- | 0.001 | 0.001 |
| | | | Cobalt | -- | -- | 3E-09 | 3E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Nickel | -- | -- | 7E-09 | 7E-09 | RS | -- | -- | 0.0008 | 0.0008 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 5E-08 | 5E-08 | | -- | -- | 0.006 | 0.006 |
| | | Exposure Point Total | | | | | 5E-08 | | | | | 0.006 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-21.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-06 | 3E-06 | RS | -- | -- | 2 | 2 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.03 | 0.03 |
| | | | Benzene | -- | -- | 2E-07 | 2E-07 | IM | -- | -- | 0.002 | 0.002 |
| | | | Ethylbenzene | -- | -- | 1E-07 | 1E-07 | DV | -- | -- | 0.0002 | 0.0002 |
| | | | Naphthalene | -- | -- | 9E-08 | 9E-08 | NV; RS | -- | -- | 0.002 | 0.002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | 0.00003 | 0.00003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.007 | 0.007 |
| | | | Chemical Total | -- | -- | 3E-06 | 3E-06 | | -- | -- | 3 | 3 |
| | | Exposure Point Total | | | | | 3E-06 | | | | | 3.000 |
| | Exposure Medium Total | | | | | | 3E-06 | | | | | 3 |
| Medium Total | | | | | | | 4E-05 | | | | | 3 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 3E-11 | 3E-11 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 4E-09 | 4E-09 | IM | -- | -- | 0.00005 | 0.00005 |
| | | | Chloroform | -- | -- | 2E-11 | 2E-11 | HP | -- | -- | 0.00000003 | 0.00000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000004 | 0.0000004 |
| | | | Naphthalene | -- | -- | 8E-10 | 8E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 2E-12 | 2E-12 | NV | -- | -- | 0.0000007 | 0.0000007 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Trichloroethene | -- | -- | 8E-12 | 8E-12 | DV; IM | -- | -- | 0.000003 | 0.000003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 2E-14 | 2E-14 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | 0.00000005 | 0.00000005 |

Table 9-21.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk (1) | | | | Non-Carcinogenic Hazard Quotient (1) | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Chemical Total | -- | -- | 6E-09 | 6E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 6E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | Receptor Risk Total | 4E-05 | | | | Receptor Hazard Index (HI) | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.02 |
| Total Dermal (DM) HI across All Media = | 0.04 |
| Total Developmental (DV) HI across All Media = | 0.09 |
| Total Endocrine (EN) HI across All Media = | 0.02 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.2 |
| Total Hepatic (HP) HI across All Media = | 0.004 |
| Total Immune (IM) HI across All Media = | 0.008 |
| Total Nervous (NV) HI across All Media = | 0.1 |
| Total Other (OT) HI across All Media = | 0.2 |
| Total Reproductive (RP) HI across All Media = | 0.03 |
| Total Respiratory (RS) HI across All Media = | 2 |
| Total Urinary (UR) HI across All Media = | 0.02 |

Table 9-22.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 3E-08 | 4E-08 | -- | 7E-08 | HM; IM | 0.001 | 0.001 | -- | 0.002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.003 | 0.003 | -- | 0.005 |
| | | | Benzene | 2E-09 | 4E-11 | -- | 2E-09 | IM | 0.00006 | 0.000001 | -- | 0.00006 |
| | | | Ethylbenzene | 2E-09 | 2E-09 | -- | 4E-09 | HP; UR | 0.00001 | 0.00001 | -- | 0.00002 |
| | | | Naphthalene | 7E-09 | 8E-09 | -- | 2E-08 | OT | 0.00002 | 0.00002 | -- | 0.00005 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00001 | 0.00002 | -- | 0.00003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 4E-08 | 5E-09 | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 1E-06 | 2E-07 | -- | 2E-06 | DV | 0.01 | 0.06 | -- | 0.07 |
| | | | Benzo(b)fluoranthene | 4E-08 | 5E-09 | -- | 5E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 2E-08 | 3E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 3E-08 | 3E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 5E-10 | 2E-09 | -- | 3E-09 | HP | 0.0005 | 0.002 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 7E-08 | 8E-08 | -- | 2E-07 | RP | 0.006 | 0.006 | -- | 0.01 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.002 | 0.0009 | -- | 0.003 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.03 | 0.08 | -- | 0.1 |
| | | | Arsenic | 2E-07 | 4E-07 | -- | 5E-07 | CV; DM | 0.003 | 0.005 | -- | 0.008 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.003 | 0.005 | -- | 0.008 |
| | | | Chromium, Total | 2E-06 | 6E-07 | -- | 2E-06 | NA | 0.003 | 0.04 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.003 | 0.001 | -- | 0.004 |
| | | | Copper | -- | -- | -- | -- | GI | 0.01 | 0.004 | -- | 0.01 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.005 | -- | 0.02 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.004 | 0.03 | -- | 0.04 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.0007 | 0.004 | -- | 0.005 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.004 | 0.04 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0006 | 0.006 | -- | 0.006 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.0005 | -- | 0.002 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.0006 | 0.009 | -- | 0.01 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.001 | 0.0004 | -- | 0.001 |
| | | | Chemical Total | 4E-06 | 1E-06 | -- | 5E-06 | | 0.1 | 0.3 | -- | 0.4 |
| | | Exposure Point Total | | | | | 5E-06 | | | | | 0.4 |
| | Exposure Medium Total | | | | | | 5E-06 | | | | | 0.4 |

Table 9-22.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 5E-13 | 5E-13 | RS | -- | -- | 0.000001 | 0.000001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00000002 | 0.00000002 |
| | | | Benzene | -- | -- | 1E-14 | 1E-14 | IM | -- | -- | 4E-10 | 4E-10 |
| | | | Ethylbenzene | -- | -- | 2E-14 | 2E-14 | DV | -- | -- | 6E-11 | 6E-11 |
| | | | Naphthalene | -- | -- | 1E-13 | 1E-13 | NV; RS | -- | -- | 0.000000007 | 0.000000007 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.000000001 | 0.000000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 4E-11 | 4E-11 | DV | -- | -- | 0.00008 | 0.00008 |
| | | | Benzo(b)fluoranthene | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 7E-13 | 7E-13 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 9E-13 | 9E-13 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 8E-15 | 8E-15 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | 0.000000005 | 0.000000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | Arsenic | -- | -- | 4E-11 | 4E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Cadmium (Diet) | -- | -- | 4E-11 | 4E-11 | UR | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.00005 | 0.00005 |
| | | | Cobalt | -- | -- | 6E-11 | 6E-11 | RS | -- | -- | 0.000008 | 0.000008 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.00008 | 0.00008 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000002 | 0.00000002 |
| | | | Nickel | -- | -- | 1E-10 | 1E-10 | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-09 | 2E-09 | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | 2E-09 | | | | | 0.0003 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-22.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 9E-08 | 9E-08 | RS | -- | -- | 0.2 | 0.2 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Benzene | -- | -- | 5E-09 | 5E-09 | IM | -- | -- | 0.0001 | 0.0001 |
| | | | Ethylbenzene | -- | -- | 4E-09 | 4E-09 | DV | -- | -- | 0.00001 | 0.00001 |
| | | | Naphthalene | -- | -- | 3E-09 | 3E-09 | NV; RS | -- | -- | 0.0002 | 0.0002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-10 | 4E-10 | -- | -- | -- | 0.000002 | 0.000002 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Chemical Total | -- | -- | 1E-07 | 1E-07 | | -- | -- | 0.2 | 0.2 |
| | | Exposure Point Total | | | | | 1E-07 | | | | | 0.200 |
| | Exposure Medium Total | | | | | | 1E-07 | | | | | 0.2 |
| Medium Total | | | | | | | 5E-06 | | | | | 0.6 |
| Notes: | | | | | | Receptor Risk Total | 5E-06 | | | | Receptor Hazard Index (HI) | 0.6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.008 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.07 |
| Total Endocrine (EN) HI across All Media = | 0.004 |
| Total Gastrointestinal (GI) HI across All Media = | 0.03 |
| Total Hematological (HM) HI across All Media = | 0.1 |
| Total Hepatic (HP) HI across All Media = | 0.003 |
| Total Immune (IM) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.05 |
| Total Other (OT) HI across All Media = | 0.1 |
| Total Reproductive (RP) HI across All Media = | 0.01 |
| Total Respiratory (RS) HI across All Media = | 0.2 |
| Total Urinary (UR) HI across All Media = | 0.008 |

Table 9-23.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.05 | 0.004 | -- | 0.05 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.1 | 0.009 | -- | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.003 | 0.000003 | -- | 0.003 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.0006 | 0.00004 | -- | 0.0006 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.001 | 0.00007 | -- | 0.001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0007 | 0.00005 | -- | 0.0007 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.5 | 0.2 | -- | 0.7 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.02 | 0.006 | -- | 0.03 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.3 | 0.02 | -- | 0.3 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.1 | 0.003 | -- | 0.1 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 1 | 0.2 | -- | 2 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.1 | 0.02 | -- | 0.2 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.2 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.1 | 0.1 | -- | 0.2 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.2 | 0.004 | -- | 0.2 |
| | | | Copper | -- | -- | -- | -- | GI | 0.5 | 0.01 | -- | 0.5 |
| | | | Iron | -- | -- | -- | -- | GI | 0.6 | 0.01 | -- | 0.6 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.2 | 0.1 | -- | 0.3 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.03 | 0.01 | -- | 0.05 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.2 | 0.1 | -- | 0.3 |
| | | | Silver | -- | -- | -- | -- | DM | 0.03 | 0.02 | -- | 0.05 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.06 | 0.001 | -- | 0.06 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.03 | 0.03 | -- | 0.06 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.05 | 0.001 | -- | 0.05 |
| | | | Chemical Total | -- | -- | -- | -- | | 5 | 0.9 | -- | 6 |
| | | Exposure Point Total | | | | | -- | | | | | 6 |
| | Exposure Medium Total | | | | | | -- | | | | | 6 |

Table 9-23.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.000008 | 0.000008 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.000000003 | 0.000000003 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 5E-10 | 5E-10 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.00000006 | 0.00000006 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.0007 | 0.0007 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000004 | 0.00000004 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00004 | 0.00004 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00006 | 0.00006 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0007 | 0.0007 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-23.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.9 | 0.9 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.0007 | 0.0007 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.00006 | 0.00006 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.0009 | 0.0009 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.001 | 0.001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 1 | 1 |
| | | Exposure Point Total | | | | | -- | | | | | 1.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | -- | | | | | 7 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 7 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.2 |
| Total Dermal (DM) HI across All Media = | 0.3 |
| Total Developmental (DV) HI across All Media = | 0.7 |
| Total Endocrine (EN) HI across All Media = | 0.2 |
| Total Gastrointestinal (GI) HI across All Media = | 1 |
| Total Hematological (HM) HI across All Media = | 2 |
| Total Hepatic (HP) HI across All Media = | 0.03 |
| Total Immune (IM) HI across All Media = | 0.06 |
| Total Nervous (NV) HI across All Media = | 0.5 |
| Total Other (OT) HI across All Media = | 2 |
| Total Reproductive (RP) HI across All Media = | 0.3 |
| Total Respiratory (RS) HI across All Media = | 0.9 |
| Total Urinary (UR) HI across All Media = | 0.2 |

Table 9-24.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.005 | 0.00007 | -- | 0.005 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.01 | 0.0002 | -- | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.0003 | 0.00000007 | -- | 0.0003 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.00005 | 0.0000008 | -- | 0.00005 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.0001 | 0.000002 | -- | 0.0001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00006 | 0.000001 | -- | 0.00006 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.05 | 0.003 | -- | 0.05 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.002 | 0.0001 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.02 | 0.0004 | -- | 0.02 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.00006 | -- | 0.01 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.1 | 0.005 | -- | 0.1 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.01 | 0.0003 | -- | 0.01 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.01 | 0.0003 | -- | 0.01 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.01 | 0.002 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.01 | 0.00008 | -- | 0.01 |
| | | | Copper | -- | -- | -- | -- | GI | 0.05 | 0.0002 | -- | 0.05 |
| | | | Iron | -- | -- | -- | -- | GI | 0.05 | 0.0003 | -- | 0.05 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.02 | 0.002 | -- | 0.02 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.003 | 0.0002 | -- | 0.004 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.002 | -- | 0.02 |
| | | | Silver | -- | -- | -- | -- | DM | 0.003 | 0.0004 | -- | 0.003 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.006 | 0.00003 | -- | 0.006 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.003 | 0.0006 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.004 | 0.00002 | -- | 0.004 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.4 | 0.02 | -- | 0.5 |
| | | Exposure Point Total | | | | | -- | | | | | 0.5 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.5 |

Table 9-24.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.000008 | 0.000008 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.000000003 | 0.000000003 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 5E-10 | 5E-10 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.00000006 | 0.00000006 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.0007 | 0.0007 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000004 | 0.00000004 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00004 | 0.00004 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00006 | 0.00006 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0007 | 0.0007 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-24.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.9 | 0.9 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.0007 | 0.0007 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.00006 | 0.00006 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.0009 | 0.0009 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.001 | 0.001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 1 | 1 |
| | | Exposure Point Total | | | | | -- | | | | | 1.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | -- | | | | | 1 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 1 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.01 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.06 |
| Total Endocrine (EN) HI across All Media = | 0.01 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.1 |
| Total Hepatic (HP) HI across All Media = | 0.003 |
| Total Immune (IM) HI across All Media = | 0.006 |
| Total Nervous (NV) HI across All Media = | 0.06 |
| Total Other (OT) HI across All Media = | 0.2 |
| Total Reproductive (RP) HI across All Media = | 0.03 |
| Total Respiratory (RS) HI across All Media = | 0.9 |
| Total Urinary (UR) HI across All Media = | 0.01 |

Table 9-25.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 1E-06 | 7E-08 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | 7E-08 | 7E-11 | -- | 7E-08 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 7E-08 | 4E-09 | -- | 7E-08 | -- | -- | -- | -- | -- |
| | | | Naphthalene | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 2E-06 | 8E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 8E-05 | 3E-05 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 2E-06 | 8E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-06 | 5E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 2E-06 | 6E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 2E-08 | 4E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-06 | 2E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 7E-06 | 7E-07 | -- | 8E-06 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 1E-04 | 1E-04 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 2E-04 | 1E-04 | -- | 3E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 3E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 3E-04 | | | | | -- |

Table 9-25.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 8E-13 | 8E-13 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 6E-12 | 6E-12 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 8E-10 | 8E-10 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 5E-13 | 5E-13 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 6E-11 | 6E-11 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 6E-08 | 6E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 6E-08 | | | | | -- |
| | | Vapors above Site | | | | | | | | | | |

Table 9-25.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-06 | 3E-06 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 4E-06 | 4E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 4E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 4E-06 | | | | | -- |
| Medium Total | | | | | | | 3E-04 | | | | | -- |
| | | | | | | Receptor Risk Total | 3E-04 | | | | Receptor Hazard Index (HI) | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-26.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.009 | 0.0004 | -- | 0.009 |
| | | | Arsenic | 6E-07 | 1E-07 | -- | 7E-07 | CV; DM | 0.004 | 0.0008 | -- | 0.005 |
| | | | Chromium, Total | 1E-06 | 2E-06 | -- | 4E-06 | NA | 0.003 | 0.005 | -- | 0.007 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.009 | 0.0004 | -- | 0.009 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.0004 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.008 | 0.0004 | -- | 0.009 |
| | | | Chemical Total | 2E-06 | 3E-06 | -- | 5E-06 | | 0.04 | 0.007 | -- | 0.05 |
| | | Exposure Point Total | | | | | 5E-06 | | | | | 0.05 |
| | Exposure Medium Total | | | | | | 5E-06 | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Arsenic | -- | -- | 6E-10 | 6E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | 7E-09 | 7E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 9E-09 | 9E-09 | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | 9E-09 | | | | | 0.0007 |
| | Exposure Medium Total | | | | | | 9E-09 | | | | | 0.0007 |
| Medium Total | | | | | | | 5E-06 | | | | | 0.05 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 3E-11 | 3E-11 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 4E-09 | 4E-09 | IM | -- | -- | 0.00005 | 0.00005 |
| | | | Chloroform | -- | -- | 2E-11 | 2E-11 | HP | -- | -- | 0.00000003 | 0.00000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000004 | 0.0000004 |
| | | | Naphthalene | -- | -- | 8E-10 | 8E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 2E-12 | 2E-12 | NV | -- | -- | 0.0000007 | 0.0000007 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Trichloroethene | -- | -- | 8E-12 | 8E-12 | DV; IM | -- | -- | 0.000003 | 0.000003 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |

Table 9-26.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 2E-14 | 2E-14 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Chemical Total | -- | -- | 6E-09 | 6E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 6E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 6E-09 | | | | | 0.0001 |
| | | | | | | Receptor Risk Total | 5E-06 | | | | Receptor Hazard Index (HI) | 0.05 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.005 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.00003 |
| Total Endocrine (EN) HI across All Media = | 0.009 |
| Total Gastrointestinal (GI) HI across All Media = | 0.01 |
| Total Hepatic (HP) HI across All Media = | 0.000002 |
| Total Immune (IM) HI across All Media = | 0.00005 |
| Total Nervous (NV) HI across All Media = | 0.01 |
| Total Reproductive (RP) HI across All Media = | 0.00003 |
| Total Respiratory (RS) HI across All Media = | 0.0003 |
| Total Urinary (UR) HI across All Media = | 0.000002 |

Table 9-27.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.002 | 0.0006 | -- | 0.002 |
| | | | Arsenic | 5E-08 | 9E-08 | -- | 1E-07 | CV; DM | 0.0007 | 0.001 | -- | 0.002 |
| | | | Chromium, Total | 3E-07 | 1E-07 | -- | 5E-07 | NA | 0.0005 | 0.008 | -- | 0.009 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.002 | 0.0006 | -- | 0.002 |
| | | | Iron | -- | -- | -- | -- | GI | 0.002 | 0.0007 | -- | 0.003 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.002 | 0.0006 | -- | 0.002 |
| | | | Chemical Total | 4E-07 | 2E-07 | -- | 6E-07 | | 0.008 | 0.01 | -- | 0.02 |
| | | Exposure Point Total | | | | | 6E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 6E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | 1E-11 | 1E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000001 | 0.000001 |
| | | | Chromium, Total | -- | -- | 4E-10 | 4E-10 | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Cobalt | -- | -- | 3E-11 | 3E-11 | RS | -- | -- | 0.000004 | 0.000004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 4E-10 | 4E-10 | | -- | -- | 0.00003 | 0.00003 |
| | | Exposure Point Total | | | | | 4E-10 | | | | | 0.00003 |
| | Exposure Medium Total | | | | | | 4E-10 | | | | | 0.00003 |
| Medium Total | | | | | | | 6E-07 | | | | | 0.02 |
| | | | | | | Receptor Risk Total | 6E-07 | | | | Receptor Hazard Index (HI) | 0.02 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.004 |
| Total Developmental (DV) HI across All Media = | 0.000001 |
| Total Endocrine (EN) HI across All Media = | 0.002 |
| Total Gastrointestinal (GI) HI across All Media = | 0.003 |
| Total Nervous (NV) HI across All Media = | 0.002 |
| Total Reproductive (RP) HI across All Media = | 0.000001 |
| Total Respiratory (RS) HI across All Media = | 0.00002 |

Table 9-28.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.08 | 0.002 | -- | 0.08 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.04 | 0.004 | -- | 0.04 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.03 | 0.02 | -- | 0.05 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.08 | 0.002 | -- | 0.08 |
| | | | Iron | -- | -- | -- | -- | GI | 0.09 | 0.002 | -- | 0.09 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.08 | 0.002 | -- | 0.08 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.4 | 0.04 | -- | 0.4 |
| | | Exposure Point Total | | | | | -- | | | | | 0.4 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | -- | | | | | 0.4 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.04 |
| Total Dermal (DM) HI across All Media = | 0.1 |
| Total Developmental (DV) HI across All Media = | 0.00001 |
| Total Endocrine (EN) HI across All Media = | 0.08 |
| Total Gastrointestinal (GI) HI across All Media = | 0.09 |
| Total Nervous (NV) HI across All Media = | 0.08 |
| Total Reproductive (RP) HI across All Media = | 0.00001 |
| Total Respiratory (RS) HI across All Media = | 0.0001 |

Table 9-29.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.008 | 0.00004 | -- | 0.008 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.003 | 0.00009 | -- | 0.003 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.002 | 0.0005 | -- | 0.003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.008 | 0.00004 | -- | 0.008 |
| | | | Iron | -- | -- | -- | -- | GI | 0.008 | 0.00004 | -- | 0.008 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.00004 | -- | 0.007 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.04 | 0.0007 | -- | 0.04 |
| | | Exposure Point Total | | | | | -- | | | | | 0.04 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.04 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | -- | | | | | 0.04 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.003 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.00001 |
| Total Endocrine (EN) HI across All Media = | 0.008 |
| Total Gastrointestinal (GI) HI across All Media = | 0.008 |
| Total Nervous (NV) HI across All Media = | 0.008 |
| Total Reproductive (RP) HI across All Media = | 0.00001 |
| Total Respiratory (RS) HI across All Media = | 0.0001 |

Table 9-30.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 2E-06 | 2E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-05 | 2E-05 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 2E-05 | 2E-05 | -- | 4E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 4E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 4E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-08 | 1E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-08 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-08 | | | | | -- |
| Medium Total | | | | | | | 4E-05 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 4E-05 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-31.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 1E-07 | 1E-08 | -- | 1E-07 | CV; DM | 0.002 | 0.0002 | -- | 0.002 |
| | | | Chromium, Total | 1E-06 | 2E-06 | -- | 3E-06 | NA | 0.001 | 0.0008 | -- | 0.002 |
| | | | Chemical Total | 1E-06 | 2E-06 | -- | 3E-06 | | 0.003 | 0.001 | -- | 0.004 |
| | | Exposure Point Total | | | | | 3E-06 | | | | | 0.004 |
| | Exposure Medium Total | | | | | | 3E-06 | | | | | 0.004 |
| Medium Total | | | | | | | 3E-06 | | | | | 0.004 |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 1E-10 | 1E-10 | -- | 3E-10 | HP | 0.0001 | 0.0001 | -- | 0.0003 |
| | | | 4,4'-DDE | 1E-08 | 1E-08 | -- | 2E-08 | HP | 0.0008 | 0.0008 | -- | 0.002 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 1E-09 | 1E-09 | -- | 2E-09 | CV; DM | 0.00002 | 0.00002 | -- | 0.00003 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.00000005 | 0.00000005 | -- | 0.0000001 |
| | | | Chromium, Total | 1E-08 | 1E-08 | -- | 3E-08 | NA | 0.00001 | 0.00001 | -- | 0.00002 |
| | | | Copper | -- | -- | -- | -- | GI | 0.000002 | 0.000002 | -- | 0.000003 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.0000004 | 0.0000004 | -- | 0.0000007 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.0000004 | 0.0000004 | -- | 0.0000008 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0000002 | 0.0000002 | -- | 0.0000003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.000001 | 0.000001 | -- | 0.000002 |
| | | | Chemical Total | 3E-08 | 3E-08 | -- | 5E-08 | | 0.001 | 0.001 | -- | 0.002 |
| | | Exposure Point Total | | | | | 5E-08 | | | | | 0.002 |
| | Exposure Medium Total | | | | | | 5E-08 | | | | | 0.002 |
| Medium Total | | | | | | | 5E-08 | | | | | 0.002 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.001 | 0.001 | -- | 0.003 |
| | | | Arsenic | 2E-07 | 3E-08 | -- | 3E-07 | CV; DM | 0.004 | 0.0005 | -- | 0.004 |
| | | | Iron | -- | -- | -- | -- | GI | 0.0001 | 0.00002 | -- | 0.0002 |
| | | | Chemical Total | 2E-07 | 3E-08 | -- | 3E-07 | | 0.005 | 0.002 | -- | 0.007 |
| | | Exposure Point Total | | | | | 3E-07 | | | | | 0.007 |
| | Exposure Medium Total | | | | | | 3E-07 | | | | | 0.007 |
| Medium Total | | | | | | | 3E-07 | | | | | 0.007 |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 7E-08 | 7E-08 | -- | 1E-07 | CV; DM | 0.001 | 0.001 | -- | 0.002 |

Table 9-31.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | 2E-08 | 2E-08 | -- | 3E-08 | NA | 0.00001 | 0.00001 | -- | 0.00002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.000001 | 0.000001 | -- | 0.000003 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.00004 | 0.00004 | -- | 0.00009 |
| | | | Chemical Total | 9E-08 | 9E-08 | -- | 2E-07 | | 0.001 | 0.001 | -- | 0.002 |
| | | Exposure Point Total | | | | | 2E-07 | | | | | 0.002 |
| | Exposure Medium Total | | | | | | 2E-07 | | | | | 0.002 |
| Medium Total | | | | | | | 2E-07 | | | | | 0.002 |
| Notes: | | | | | | Receptor Risk Total | 4E-06 | | | | Receptor Hazard Index (HI) | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.008 |
| Total Dermal (DM) HI across All Media = | 0.008 |
| Total Gastrointestinal (GI) HI across All Media = | 0.0002 |
| Total Hematological (HM) HI across All Media = | 0.003 |
| Total Hepatic (HP) HI across All Media = | 0.002 |
| Total Other (OT) HI across All Media = | 0.003 |
| Total Urinary (UR) HI across All Media = | 0.0000001 |

Table 9-32.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.09 | 0.01 | -- | 0.1 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.05 | 0.05 | -- | 0.1 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.1 | 0.06 | -- | 0.2 |
| | | Exposure Point Total | | | | | -- | | | | | 0.2 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.2 |
| Medium Total | | | | | | | -- | | | | | 0.2 |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.006 | 0.006 | -- | 0.01 |
| | | | 4,4'-DDE | -- | -- | -- | -- | HP | 0.04 | 0.04 | -- | 0.08 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.0008 | 0.0008 | -- | 0.002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.000002 | 0.000002 | -- | 0.000005 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.0005 | 0.0005 | -- | 0.001 |
| | | | Copper | -- | -- | -- | -- | GI | 0.00007 | 0.00007 | -- | 0.0001 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.00002 | 0.00002 | -- | 0.00003 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.00002 | 0.00002 | -- | 0.00004 |
| | | | Silver | -- | -- | -- | -- | DM | 0.000008 | 0.000008 | -- | 0.00002 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.00006 | 0.00006 | -- | 0.0001 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.05 | -- | 0.09 |
| | | Exposure Point Total | | | | | -- | | | | | 0.09 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.09 |
| Medium Total | | | | | | | -- | | | | | 0.09 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.03 | 0.009 | -- | 0.04 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.08 | 0.003 | -- | 0.09 |
| | | | Iron | -- | -- | -- | -- | GI | 0.003 | 0.0001 | -- | 0.003 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.1 | 0.01 | -- | 0.1 |
| | | Exposure Point Total | | | | | -- | | | | | 0.1 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.1 |
| Medium Total | | | | | | | -- | | | | | 0.1 |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.03 | 0.03 | -- | 0.05 |

Table 9-32.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.0003 | 0.0003 | -- | 0.0006 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.00003 | 0.00003 | -- | 0.00006 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.001 | 0.001 | -- | 0.002 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.03 | 0.03 | -- | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.05 |
| Medium Total | | | | | | | -- | | | | | 0.05 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.5 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.2 |
| Total Dermal (DM) HI across All Media = | 0.2 |
| Total Gastrointestinal (GI) HI across All Media = | 0.003 |
| Total Hematological (HM) HI across All Media = | 0.04 |
| Total Hepatic (HP) HI across All Media = | 0.09 |
| Total Other (OT) HI across All Media = | 0.04 |
| Total Urinary (UR) HI across All Media = | 0.000005 |

Table 9-33.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.008 | 0.002 | -- | 0.01 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.005 | 0.01 | -- | 0.01 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.01 | 0.01 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.0006 | 0.0006 | -- | 0.001 |
| | | | 4,4'-DDE | -- | -- | -- | -- | HP | 0.004 | 0.004 | -- | 0.007 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.00008 | 0.00008 | -- | 0.0002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.0000002 | 0.0000002 | -- | 0.0000005 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.00005 | 0.00005 | -- | 0.0001 |
| | | | Copper | -- | -- | -- | -- | GI | 0.000007 | 0.000007 | -- | 0.00001 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.000002 | 0.000002 | -- | 0.000003 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.000002 | 0.000002 | -- | 0.000003 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0000007 | 0.0000007 | -- | 0.000001 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.000005 | 0.000005 | -- | 0.00001 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.004 | 0.004 | -- | 0.009 |
| | | Exposure Point Total | | | | | -- | | | | | 0.009 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.009 |
| Medium Total | | | | | | | -- | | | | | 0.009 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.005 | 0.005 | -- | 0.01 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.01 | 0.002 | -- | 0.01 |
| | | | Iron | -- | -- | -- | -- | GI | 0.0005 | 0.00007 | -- | 0.0006 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.02 | 0.007 | -- | 0.03 |
| | | Exposure Point Total | | | | | -- | | | | | 0.03 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | -- | | | | | 0.03 |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.004 | 0.004 | -- | 0.008 |

Table 9-33.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.00004 | 0.00004 | -- | 0.00009 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.000005 | 0.000005 | -- | 0.00001 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.0002 | 0.0002 | -- | 0.0003 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.004 | 0.004 | -- | 0.008 |
| | | Exposure Point Total | | | | | -- | | | | | 0.008 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.008 |
| Medium Total | | | | | | | -- | | | | | 0.008 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.07 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.03 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Gastrointestinal (GI) HI across All Media = | 0.0006 |
| Total Hematological (HM) HI across All Media = | 0.01 |
| Total Hepatic (HP) HI across All Media = | 0.009 |
| Total Other (OT) HI across All Media = | 0.01 |
| Total Urinary (UR) HI across All Media = | 0.0000005 |

Table 9-34.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 4E-06 | 7E-07 | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 3E-05 | 3E-05 | -- | 6E-05 | -- | -- | -- | -- | -- |
| | | | Chemical Total | 3E-05 | 3E-05 | -- | 7E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-05 | | | | | -- |
| Medium Total | | | | | | | 7E-05 | | | | | -- |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 5E-09 | 5E-09 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | 4,4'-DDE | 5E-07 | 5E-07 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 4E-08 | 4E-08 | -- | 8E-08 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 3E-07 | 3E-07 | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Selenium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 8E-07 | 8E-07 | -- | 2E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-06 | | | | | -- |
| Medium Total | | | | | | | 2E-06 | | | | | -- |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 5E-06 | 4E-07 | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 5E-06 | 4E-07 | -- | 5E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 5E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 5E-06 | | | | | -- |
| Medium Total | | | | | | | 5E-06 | | | | | -- |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 1E-06 | 1E-06 | -- | 3E-06 | -- | -- | -- | -- | -- |

Table 9-34.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | 2E-07 | 2E-07 | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Selenium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 2E-06 | 2E-06 | -- | 3E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 3E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 3E-06 | | | | | -- |
| Medium Total | | | | | | | 3E-06 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 8E-05 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-35.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Maintenance Worker - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 3E-06 | 7E-07 | -- | 4E-06 | CV; DM | 0.02 | 0.004 | -- | 0.02 |
| | | | Chromium, Total | 4E-06 | 6E-06 | -- | 1E-05 | NA | 0.007 | 0.01 | -- | 0.02 |
| | | | Chemical Total | 7E-06 | 7E-06 | -- | 1E-05 | | 0.03 | 0.02 | -- | 0.04 |
| | | Exposure Point Total | | | | | 1E-05 | | | | | 0.04 |
| | Exposure Medium Total | | | | | | 1E-05 | | | | | 0.04 |
| Medium Total | | | | | | | 1E-05 | | | | | 0.04 |
| Notes: | | | | | | Receptor Risk Total | 1E-05 | | | | Receptor Hazard Index (HI) | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.02 |
| Total Dermal (DM) HI across All Media = | 0.02 |

Table 9-36.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Trespasser (Teen) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 1E-07 | 1E-08 | -- | 1E-07 | CV; DM | 0.002 | 0.0002 | -- | 0.002 |
| | | | Chromium, Total | 9E-07 | 1E-06 | -- | 2E-06 | NA | 0.0007 | 0.0005 | -- | 0.001 |
| | | | Chemical Total | 1E-06 | 1E-06 | -- | 2E-06 | | 0.003 | 0.0007 | -- | 0.003 |
| | | Exposure Point Total | | | | | 2E-06 | | | | | 0.003 |
| | Exposure Medium Total | | | | | | 2E-06 | | | | | 0.003 |
| Medium Total | | | | | | | 2E-06 | | | | | 0.003 |
| Notes: | | | | | | Receptor Risk Total | 2E-06 | | | | Receptor Hazard Index (HI) | 0.003 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.002 |

Table 9-37.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Child) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.1 | 0.01 | -- | 0.1 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.03 | 0.03 | -- | 0.06 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.1 | 0.04 | -- | 0.2 |
| | | Exposure Point Total | | | | | -- | | | | | 0.2 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.2 |
| Medium Total | | | | | | | -- | | | | | 0.2 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.2 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.1 |
| Total Dermal (DM) HI across All Media = | 0.1 |

Table 9-38.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.009 | 0.002 | -- | 0.01 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.003 | 0.006 | -- | 0.009 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.01 | 0.009 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.01 |
| Total Dermal (DM) HI across All Media = | 0.01 |

Table 9-39.RME
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 5E-06 | 7E-07 | -- | 6E-06 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-05 | 2E-05 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Chemical Total | 2E-05 | 2E-05 | -- | 5E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 5E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 5E-05 | | | | | -- |
| Medium Total | | | | | | | 5E-05 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 5E-05 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

# Calculation of Chemical Cancer Risks and Non-Cancer Hazards: Central Tendency Exposure

Table 7-1.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 8.16E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-09 | 8.53E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 2.26E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-08 | 2.36E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 4.56E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-09 | 4.76E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.27E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-08 | 1.33E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 3.44E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 8E-10 | 3.60E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 8.46E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 8.84E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.01 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 6.65E-04 | mg/kg-day | -- | -- | -- | 6.94E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.007 |
| | | | | Antimony | 3.29E+01 | mg/kg | 1.08E-06 | mg/kg-day | -- | -- | -- | 1.13E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.03 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 9.85E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 1.03E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 6.69E-07 | mg/kg-day | -- | -- | -- | 6.99E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.007 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 5.47E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-06 | 5.71E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.02 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 3.37E-07 | mg/kg-day | -- | -- | -- | 3.52E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Copper | 2.42E+03 | mg/kg | 7.93E-05 | mg/kg-day | -- | -- | -- | 8.28E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.03 |
| | | | | Iron | 4.73E+04 | mg/kg | 1.55E-03 | mg/kg-day | -- | -- | -- | 1.62E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.02 |
| | | | | Manganese | 4.21E+02 | mg/kg | 1.38E-05 | mg/kg-day | -- | -- | -- | 1.44E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.006 |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.57E-08 | mg/kg-day | -- | -- | -- | 2.69E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.002 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.65E-05 | mg/kg-day | -- | -- | -- | 1.72E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.009 |
| | | | | Silver | 5.20E+01 | mg/kg | 1.71E-06 | mg/kg-day | -- | -- | -- | 1.78E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.004 |
| | | | | Thallium | 8.63E-02 | mg/kg | 2.83E-09 | mg/kg-day | -- | -- | -- | 2.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 6.97E-07 | mg/kg-day | -- | -- | -- | 7.28E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.001 |
| | | | | Zinc | 1.70E+03 | mg/kg | 5.56E-05 | mg/kg-day | -- | -- | -- | 5.80E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 0.2 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 2.99E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-09 | 3.13E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 8.27E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-09 | 8.64E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 1.67E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-09 | 1.75E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.67E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-09 | 4.87E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 9.71E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-10 | 1.01E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 7.16E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 9E-09 | 7.48E-13 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 1.88E-05 | mg/kg-day | -- | -- | -- | 1.96E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0002 |
| | | | | Antimony | 3.29E+01 | mg/kg | 3.05E-08 | mg/kg-day | -- | -- | -- | 3.18E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.005 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 1.39E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-08 | 1.45E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0005 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 1.89E-09 | mg/kg-day | -- | -- | -- | 1.97E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0008 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.54E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-06 | 1.61E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.02 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 9.50E-09 | mg/kg-day | -- | -- | -- | 9.92E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Copper | 2.42E+03 | mg/kg | 2.24E-06 | mg/kg-day | -- | -- | -- | 2.34E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0007 |
| | | | | Iron | 4.73E+04 | mg/kg | 4.37E-05 | mg/kg-day | -- | -- | -- | 4.57E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0007 |
| | | | | Manganese | 4.21E+02 | mg/kg | 3.90E-07 | mg/kg-day | -- | -- | -- | 4.07E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.004 |

Table 7-1.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | 7.26E-10 | mg/kg-day | -- | -- | -- | 7.59E-09 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0007 |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.64E-07 | mg/kg-day | -- | -- | -- | 4.85E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.006 |
| | | | | Silver | 5.20E+01 | mg/kg | 4.81E-08 | mg/kg-day | -- | -- | -- | 5.03E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.003 |
| | | | | Thallium | 8.63E-02 | mg/kg | 7.98E-11 | mg/kg-day | -- | -- | -- | 8.34E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00008 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.97E-08 | mg/kg-day | -- | -- | -- | 2.06E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.002 |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.57E-06 | mg/kg-day | -- | -- | -- | 1.64E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00005 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | 6E-06 | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | 6E-06 | | | | | 0.2 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | 3.20E-08 | µg/m³ | 6.00E-05 | m³/µg | 2E-12 | 3.35E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | 8.85E-09 | µg/m³ | 6.00E-04 | m³/µg | 5E-12 | 9.24E-08 | µg/m³ | 2.00E-03 | µg/m³ | 0.00005 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | 1.79E-08 | µg/m³ | 6.00E-05 | m³/µg | 1E-12 | 1.87E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 4.99E-09 | µg/m³ | 6.00E-04 | m³/µg | 3E-12 | 5.21E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.35E-09 | µg/m³ | 6.90E-05 | m³/µg | 9E-14 | 1.41E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 3.32E-13 | µg/m³ | 3.80E+01 | m³/µg | 1E-11 | 3.47E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000009 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | 2.61E-04 | µg/m³ | -- | -- | -- | 2.72E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0005 |
| | | | | Antimony | 2.42E-05 | µg/m³ | 4.24E-07 | µg/m³ | -- | -- | -- | 4.42E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00001 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | 6.44E-08 | µg/m³ | 4.30E-03 | m³/µg | 3E-10 | 6.73E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00004 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | 2.62E-07 | µg/m³ | 1.80E-03 | m³/µg | 5E-10 | 2.74E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0003 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | 2.15E-06 | µg/m³ | 1.20E-02 | m³/µg | 3E-08 | 2.24E-05 | µg/m³ | 8.00E-03 | µg/m³ | 0.003 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | 1.32E-07 | µg/m³ | 9.00E-03 | m³/µg | 1E-09 | 1.38E-06 | µg/m³ | 6.00E-03 | µg/m³ | 0.0002 |
| | | | | Copper | 1.78E-03 | µg/m³ | 3.11E-05 | µg/m³ | -- | -- | -- | 3.25E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | 6.08E-04 | µg/m³ | -- | -- | -- | 6.35E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | 5.42E-06 | µg/m³ | -- | -- | -- | 5.66E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.001 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 1.01E-08 | µg/m³ | -- | -- | -- | 1.05E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 6.46E-06 | µg/m³ | 2.60E-04 | m³/µg | 2E-09 | 6.75E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0007 |
| | | | | Silver | 3.83E-05 | µg/m³ | 6.69E-07 | µg/m³ | -- | -- | -- | 6.99E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 1.11E-09 | µg/m³ | -- | -- | -- | 1.16E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 2.74E-07 | µg/m³ | -- | -- | -- | 2.86E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00003 |
| | | | | Zinc | 1.25E-03 | µg/m³ | 2.18E-05 | µg/m³ | -- | -- | -- | 2.28E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-08 | | | | | 0.006 |
| | | Exp. Point Total | | | | | | | | | 3E-08 | | | | | 0.006 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.57E-04 | µg/m³ | 2.75E-06 | µg/m³ | 6.00E-05 | m³/µg | 2E-10 | 2.88E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.29E-09 | µg/m³ | 9.25E-11 | µg/m³ | 3.80E+01 | m³/µg | 4E-09 | 9.67E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 4E-09 | | | | | 0.00002 |
| | | Exp. Point Total | | | | | | | | | 4E-09 | | | | | 0.00002 |
| | Exp. Medium Total | | | | | | | | | | 3E-08 | | | | | 0.006 |
| Medium Total | | | | | | | | | | | 6E-06 | | | | | 0.2 |

Table 7-1.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 3.03E-07 | µg/m³ | 2.60E-05 | m³/µg | 8E-12 | 3.17E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 1.15E-04 | µg/m³ | 7.80E-06 | m³/µg | 9E-10 | 1.20E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00004 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 2.31E-07 | µg/m³ | 2.30E-05 | m³/µg | 5E-12 | 2.41E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000002 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 2.93E-06 | µg/m³ | -- | -- | -- | 3.07E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 1.29E-04 | µg/m³ | 2.50E-06 | m³/µg | 3E-10 | 1.34E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000001 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 1.33E-05 | µg/m³ | -- | -- | -- | 1.39E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000003 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 5.49E-06 | µg/m³ | 3.40E-05 | m³/µg | 2E-10 | 5.73E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 2.24E-06 | µg/m³ | 2.60E-07 | m³/µg | 6E-13 | 2.34E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000006 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 4.08E-04 | µg/m³ | -- | -- | -- | 4.27E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.0000009 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 4.37E-07 | µg/m³ | 4.10E-06 | m³/µg | 2E-12 | 4.56E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000002 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 3.44E-04 | µg/m³ | -- | -- | -- | 3.59E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 8.29E-08 | µg/m³ | -- | -- | -- | 8.66E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 1.39E-06 | µg/m³ | -- | -- | -- | 1.46E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 7.92E-11 | µg/m³ | 6.00E-05 | m³/µg | 5E-15 | 8.28E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 1.58E-08 | µg/m³ | -- | -- | -- | 1.65E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 1.73E-13 | µg/m³ | 3.80E+01 | m³/µg | 7E-12 | 1.80E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 2.32E-08 | µg/m³ | -- | -- | -- | 2.42E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000008 |
| | | | Exp. Route Total | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 6E-06 | | | | | 0.2 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-2.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 4.78E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-09 | 2.23E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 1.32E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-08 | 6.17E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 2.67E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-09 | 1.25E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 7.45E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-09 | 3.48E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.34E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-10 | 9.41E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 3.30E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 4E-08 | 2.31E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 2.60E-04 | mg/kg-day | -- | -- | -- | 1.82E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 3.29E+01 | mg/kg | 4.22E-07 | mg/kg-day | -- | -- | -- | 2.95E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.007 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 3.85E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-08 | 2.69E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 2.61E-07 | mg/kg-day | -- | -- | -- | 1.83E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 3.20E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-06 | 1.50E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.005 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 1.32E-07 | mg/kg-day | -- | -- | -- | 9.21E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Copper | 2.42E+03 | mg/kg | 3.10E-05 | mg/kg-day | -- | -- | -- | 2.17E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.007 |
| | | | | Iron | 4.73E+04 | mg/kg | 6.05E-04 | mg/kg-day | -- | -- | -- | 4.24E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.006 |
| | | | | Manganese | 4.21E+02 | mg/kg | 5.40E-06 | mg/kg-day | -- | -- | -- | 3.78E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.002 |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.01E-08 | mg/kg-day | -- | -- | -- | 7.04E-08 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.0004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 6.43E-06 | mg/kg-day | -- | -- | -- | 4.50E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Silver | 5.20E+01 | mg/kg | 6.66E-07 | mg/kg-day | -- | -- | -- | 4.67E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0009 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.11E-09 | mg/kg-day | -- | -- | -- | 7.74E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0008 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.72E-07 | mg/kg-day | -- | -- | -- | 1.91E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.0004 |
| | | | | Zinc | 1.70E+03 | mg/kg | 2.17E-05 | mg/kg-day | -- | -- | -- | 1.52E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0005 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.04 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 2.59E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-10 | 1.81E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 7.16E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-10 | 5.01E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 1.45E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-10 | 1.01E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.04E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-10 | 2.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.40E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-09 | 5.88E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 6.19E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 8E-08 | 4.34E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 1.62E-04 | mg/kg-day | -- | -- | -- | 1.14E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Antimony | 3.29E+01 | mg/kg | 2.64E-07 | mg/kg-day | -- | -- | -- | 1.84E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.03 |
| | | | | Arsenic | 5.01E+00 | mg/kg | 1.20E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | 8.41E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 1.63E-08 | mg/kg-day | -- | -- | -- | 1.14E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.33E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-07 | 9.34E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.1 |
| | | | | Cobalt | 1.03E+01 | mg/kg | 8.22E-08 | mg/kg-day | -- | -- | -- | 5.75E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Copper | 2.42E+03 | mg/kg | 1.94E-05 | mg/kg-day | -- | -- | -- | 1.36E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.004 |
| | | | | Iron | 4.73E+04 | mg/kg | 3.78E-04 | mg/kg-day | -- | -- | -- | 2.65E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Manganese | 4.21E+02 | mg/kg | 3.37E-06 | mg/kg-day | -- | -- | -- | 2.36E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.02 |

Table 7-2.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.28E-09 | mg/kg-day | -- | -- | -- | 4.40E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.02E-06 | mg/kg-day | -- | -- | -- | 2.81E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.04 |
| | | | | Silver | 5.20E+01 | mg/kg | 4.16E-07 | mg/kg-day | -- | -- | -- | 2.91E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.01 |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.91E-10 | mg/kg-day | -- | -- | -- | 4.83E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.70E-07 | mg/kg-day | -- | -- | -- | 1.19E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.009 |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.36E-05 | mg/kg-day | -- | -- | -- | 9.50E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | 5E-07 | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | 2E-06 | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | 2E-06 | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | 5.38E-09 | µg/m³ | 6.00E-05 | m³/µg | 3E-13 | 1.25E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | 1.49E-09 | µg/m³ | 6.00E-04 | m³/µg | 9E-13 | 3.47E-09 | µg/m³ | 2.00E-03 | µg/m³ | 0.000002 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | 3.00E-09 | µg/m³ | 6.00E-05 | m³/µg | 2E-13 | 7.00E-09 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 8.38E-10 | µg/m³ | 6.00E-04 | m³/µg | 5E-13 | 1.96E-09 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 7.56E-11 | µg/m³ | 6.90E-05 | m³/µg | 5E-15 | 5.29E-10 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.86E-14 | µg/m³ | 3.80E+01 | m³/µg | 7E-13 | 1.30E-13 | µg/m³ | 4.00E-05 | µg/m³ | 3E-09 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | 1.46E-05 | µg/m³ | -- | -- | -- | 1.02E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00002 |
| | | | | Antimony | 2.42E-05 | µg/m³ | 2.37E-08 | µg/m³ | -- | -- | -- | 1.66E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000006 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | 3.60E-09 | µg/m³ | 4.30E-03 | m³/µg | 2E-11 | 2.52E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000002 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | 1.47E-08 | µg/m³ | 1.80E-03 | m³/µg | 3E-11 | 1.03E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | 3.60E-07 | µg/m³ | 1.20E-02 | m³/µg | 4E-09 | 8.40E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.0001 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | 7.39E-09 | µg/m³ | 9.00E-03 | m³/µg | 7E-11 | 5.17E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000009 |
| | | | | Copper | 1.78E-03 | µg/m³ | 1.74E-06 | µg/m³ | -- | -- | -- | 1.22E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | 3.40E-05 | µg/m³ | -- | -- | -- | 2.38E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | 3.03E-07 | µg/m³ | -- | -- | -- | 2.12E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.00004 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 5.65E-10 | µg/m³ | -- | -- | -- | 3.96E-09 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000001 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 3.61E-07 | µg/m³ | 2.60E-04 | m³/µg | 9E-11 | 2.53E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00003 |
| | | | | Silver | 3.83E-05 | µg/m³ | 3.75E-08 | µg/m³ | -- | -- | -- | 2.62E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 6.21E-11 | µg/m³ | -- | -- | -- | 4.35E-10 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.53E-08 | µg/m³ | -- | -- | -- | 1.07E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000001 |
| | | | | Zinc | 1.25E-03 | µg/m³ | 1.22E-06 | µg/m³ | -- | -- | -- | 8.54E-06 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-09 | | | | | 0.0002 |
| | | Exp. Point Total | | | | | | | | | 5E-09 | | | | | 0.0002 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E-04 | µg/m³ | 7.31E-07 | µg/m³ | 6.00E-05 | m³/µg | 4E-11 | 1.71E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 8.37E-09 | µg/m³ | 8.19E-12 | µg/m³ | 3.80E+01 | m³/µg | 3E-10 | 5.73E-11 | µg/m³ | 4.00E-05 | µg/m³ | 0.000001 |
| | | | Exp. Route Total | | | | | | | | 4E-10 | | | | | 0.000001 |
| | | Exp. Point Total | | | | | | | | | 4E-10 | | | | | 0.000001 |
| | Exp. Medium Total | | | | | | | | | | 5E-09 | | | | | 0.0002 |
| Medium Total | | | | | | | | | | | 2E-06 | | | | | 0.3 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 2E-06 | | | | | 0.3 |

Table 7-2.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-3.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.05E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.65E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.14E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.19E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.63E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 2.12E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.67E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.02 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.71E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.07 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.47E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.68E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.05 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.44E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.99E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.06 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.88E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.06 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.46E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.01 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.45E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 4.13E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.28E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.009 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 7.09E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.75E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.39E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.4 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.21E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.16E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.35E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.56E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.64E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0003 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.28E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.007 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.95E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.65E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.17E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.03 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.34E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.15E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.001 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 6.15E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0009 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 5.48E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.006 |

Table 7-3.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.02E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0009 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 6.53E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.008 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.77E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.003 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 1.12E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0001 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.77E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.002 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.20E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00007 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.06 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.5 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.92E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.08E-08 | µg/m³ | 2.00E-03 | µg/m³ | 0.000005 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.19E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 6.11E-09 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-13 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.19E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00006 |
| | | | | Antimony | 2.42E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.19E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000002 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.88E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000005 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.21E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00003 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.63E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0003 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.62E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00003 |
| | | | | Copper | 1.78E-03 | µg/m³ | (2) | -- | -- | -- | -- | 3.81E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.44E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | (2) | -- | -- | -- | -- | 6.63E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.0001 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 7.90E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00009 |
| | | | | Silver | 3.83E-05 | µg/m³ | (2) | -- | -- | -- | -- | 8.19E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.35E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000003 |
| | | | | Zinc | 1.25E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.67E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.54E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.30E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 1.11E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.000003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.000003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.000003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0007 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.5 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 0.5 |

Table 7-3.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-4.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.92E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.30E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.07E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.99E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.09E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.99E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.56E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.54E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.006 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.31E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.57E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.29E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.004 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.91E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.86E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.006 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.64E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.25E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.001 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.05E-08 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.0004 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.87E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.01E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0008 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 6.65E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.64E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.0003 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.31E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.60E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.43E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00001 |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.96E-09 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.50E-09 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.21E-10 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.00002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 3.84E-14 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.00005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00001 |
| | | | | Antimony | 3.29E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.63E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.0003 |
| | | | | Arsenic | 5.01E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.45E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00002 |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-09 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.00004 |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | (2) | -- | -- | -- | -- | 8.27E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.001 |
| | | | | Cobalt | 1.03E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.09E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00002 |
| | | | | Copper | 2.42E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.20E-06 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.00004 |
| | | | | Iron | 4.73E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.34E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00003 |
| | | | | Manganese | 4.21E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.09E-07 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.0002 |

Table 7-4.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.89E-10 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.00003 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.49E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0003 |
| | | | | Silver | 5.20E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.58E-08 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0001 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 4.28E-11 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.000004 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.05E-08 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.00008 |
| | | | | Zinc | 1.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 8.40E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.04 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.04 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.92E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.08E-08 | µg/m³ | 2.00E-03 | µg/m³ | 0.000005 |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.19E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 6.11E-09 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-13 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.19E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00006 |
| | | | | Antimony | 2.42E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.19E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000002 |
| | | | | Arsenic | 3.68E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.88E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000005 |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.21E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00003 |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | (2) | -- | -- | -- | -- | 2.63E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0003 |
| | | | | Cobalt | 7.56E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.62E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00003 |
| | | | | Copper | 1.78E-03 | µg/m³ | (2) | -- | -- | -- | -- | 3.81E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.44E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | (2) | -- | -- | -- | -- | 6.63E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.0001 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 7.90E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00009 |
| | | | | Silver | 3.83E-05 | µg/m³ | (2) | -- | -- | -- | -- | 8.19E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.35E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000003 |
| | | | | Zinc | 1.25E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.67E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.54E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.30E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 1.11E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.000003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.000003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.000003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0007 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.04 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.04 |

Table 7-4.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-5.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 2.72E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 7.51E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 1.52E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.23E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.21E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 2.02E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 1.58E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 3.29E+01 | mg/kg | 2.57E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 5.01E+00 | mg/kg | 2.35E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 1.59E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.82E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 9E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 1.03E+01 | mg/kg | 8.03E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.42E+03 | mg/kg | 1.89E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.73E+04 | mg/kg | 3.69E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.21E+02 | mg/kg | 3.29E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.14E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 3.92E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 5.20E+01 | mg/kg | 4.07E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.74E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.66E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.32E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.49E+00 | mg/kg | 2.21E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 6.88E-01 | mg/kg | 6.11E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.39E+00 | mg/kg | 1.23E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 3.44E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.22E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 9.01E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 2.03E+04 | mg/kg | 2.36E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 3.29E+01 | mg/kg | 3.83E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 5.01E+00 | mg/kg | 1.75E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.04E+01 | mg/kg | 2.37E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.67E+02 | mg/kg | 1.14E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 1.03E+01 | mg/kg | 1.20E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.42E+03 | mg/kg | 2.82E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.73E+04 | mg/kg | 5.50E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.21E+02 | mg/kg | 4.90E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-5.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 7.85E-01 | mg/kg | 9.14E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 5.84E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 5.20E+01 | mg/kg | 6.06E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.00E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.48E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.70E+03 | mg/kg | 1.97E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.83E-06 | µg/m³ | 4.03E-08 | µg/m³ | 6.00E-05 | m³/µg | 2E-12 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 5.06E-07 | µg/m³ | 1.11E-08 | µg/m³ | 6.00E-04 | m³/µg | 7E-12 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.02E-06 | µg/m³ | 2.25E-08 | µg/m³ | 6.00E-05 | m³/µg | 1E-12 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 6.28E-09 | µg/m³ | 6.00E-04 | m³/µg | 4E-12 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.80E-09 | µg/m³ | 6.90E-05 | m³/µg | 1E-13 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 4.41E-13 | µg/m³ | 3.80E+01 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.49E-02 | µg/m³ | 3.47E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 2.42E-05 | µg/m³ | 5.63E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 3.68E-06 | µg/m³ | 8.56E-08 | µg/m³ | 4.30E-03 | m³/µg | 4E-10 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 1.50E-05 | µg/m³ | 3.49E-07 | µg/m³ | 1.80E-03 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.23E-04 | µg/m³ | 2.70E-06 | µg/m³ | 1.20E-02 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.56E-06 | µg/m³ | 1.76E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Copper | 1.78E-03 | µg/m³ | 4.14E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 3.48E-02 | µg/m³ | 8.08E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 3.10E-04 | µg/m³ | 7.20E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 5.77E-07 | µg/m³ | 1.34E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 3.69E-04 | µg/m³ | 8.58E-06 | µg/m³ | 2.60E-04 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Silver | 3.83E-05 | µg/m³ | 8.89E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 1.48E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 3.64E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.25E-03 | µg/m³ | 2.90E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 4E-08 | | | | | -- |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 1.54E-04 | µg/m³ | 3.40E-06 | µg/m³ | 6.00E-05 | m³/µg | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | 1.21E-10 | µg/m³ | 3.80E+01 | m³/µg | 5E-09 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-09 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 5E-09 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 4E-08 | | | | | -- |
| Medium Total | | | | | | | | | | | 1E-04 | | | | | -- |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 1E-04 | | | | | -- |

Table 7-5.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-6.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 3.77E-04 | mg/kg-day | -- | -- | -- | 3.94E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.004 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 5.82E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 9E-08 | 6.08E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.49E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-07 | 3.65E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.12E-07 | mg/kg-day | -- | -- | -- | 1.17E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Iron | 8.70E+03 | mg/kg | 2.85E-04 | mg/kg-day | -- | -- | -- | 2.98E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.57E-09 | mg/kg-day | -- | -- | -- | 3.73E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | 3E-07 | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.07E-05 | mg/kg-day | -- | -- | -- | 1.11E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 8.22E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 8.58E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 9.85E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-07 | 1.03E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.15E-09 | mg/kg-day | -- | -- | -- | 3.30E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Iron | 8.70E+03 | mg/kg | 8.05E-06 | mg/kg-day | -- | -- | -- | 8.41E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0001 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.01E-10 | mg/kg-day | -- | -- | -- | 1.05E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | 5E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 5E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.48E-04 | µg/m³ | -- | -- | -- | 1.55E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0003 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | 3.81E-08 | µg/m³ | 4.30E-03 | m³/µg | 2E-10 | 3.98E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00003 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | 1.37E-07 | µg/m³ | 1.20E-02 | m³/µg | 2E-09 | 1.43E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 4.39E-08 | µg/m³ | 9.00E-03 | m³/µg | 4E-10 | 4.58E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00008 |
| | | | | Iron | 6.40E-03 | µg/m³ | 1.12E-04 | µg/m³ | -- | -- | -- | 1.17E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.40E-09 | µg/m³ | -- | -- | -- | 1.46E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-09 | | | | | 0.0006 |
| | | Exp. Point Total | | | | | | | | | 2E-09 | | | | | 0.0006 |
| | Exp. Medium Total | | | | | | | | | | 2E-09 | | | | | 0.0006 |
| Medium Total | | | | | | | | | | | 5E-07 | | | | | 0.02 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 3.03E-07 | µg/m³ | 2.60E-05 | m³/µg | 8E-12 | 3.17E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 1.15E-04 | µg/m³ | 7.80E-06 | m³/µg | 9E-10 | 1.20E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00004 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 2.31E-07 | µg/m³ | 2.30E-05 | m³/µg | 5E-12 | 2.41E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000002 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 2.93E-06 | µg/m³ | -- | -- | -- | 3.07E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 1.29E-04 | µg/m³ | 2.50E-06 | m³/µg | 3E-10 | 1.34E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000001 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 1.33E-05 | µg/m³ | -- | -- | -- | 1.39E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000003 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 5.49E-06 | µg/m³ | 3.40E-05 | m³/µg | 2E-10 | 5.73E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 2.24E-06 | µg/m³ | 2.60E-07 | m³/µg | 6E-13 | 2.34E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000006 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 4.08E-04 | µg/m³ | -- | -- | -- | 4.27E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.0000009 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 4.37E-07 | µg/m³ | 4.10E-06 | m³/µg | 2E-12 | 4.56E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000002 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 3.44E-04 | µg/m³ | -- | -- | -- | 3.59E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-6.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 8.29E-08 | µg/m³ | -- | -- | -- | 8.66E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 1.39E-06 | µg/m³ | -- | -- | -- | 1.46E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 7.92E-11 | µg/m³ | 6.00E-05 | m³/µg | 5E-15 | 8.28E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 1.58E-08 | µg/m³ | -- | -- | -- | 1.65E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 1.73E-13 | µg/m³ | 3.80E+01 | m³/µg | 7E-12 | 1.80E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 2.32E-08 | µg/m³ | -- | -- | -- | 2.42E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000008 |
| | | | Exp. Route Total | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 5E-07 | | | | | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-7.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.47E-04 | mg/kg-day | -- | -- | -- | 1.03E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 2.28E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-08 | 1.59E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0005 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 2.05E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-07 | 9.55E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 4.37E-08 | mg/kg-day | -- | -- | -- | 3.06E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.11E-04 | mg/kg-day | -- | -- | -- | 7.80E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.40E-09 | mg/kg-day | -- | -- | -- | 9.77E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.005 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.22E-05 | mg/kg-day | -- | -- | -- | 6.45E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Arsenic | 2.96E+00 | mg/kg | 7.11E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 4.98E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 8.52E-10 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-08 | 5.97E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.008 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.73E-08 | mg/kg-day | -- | -- | -- | 1.91E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Iron | 8.70E+03 | mg/kg | 6.96E-05 | mg/kg-day | -- | -- | -- | 4.87E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0007 |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.72E-10 | mg/kg-day | -- | -- | -- | 6.11E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | 3E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 3E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 8.29E-06 | µg/m³ | -- | -- | -- | 5.80E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.00001 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | 2.13E-09 | µg/m³ | 4.30E-03 | m³/µg | 9E-12 | 1.49E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000001 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | 2.30E-08 | µg/m³ | 1.20E-02 | m³/µg | 3E-10 | 5.37E-08 | µg/m³ | 8.00E-03 | µg/m³ | 0.000007 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 2.46E-09 | µg/m³ | 9.00E-03 | m³/µg | 2E-11 | 1.72E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000003 |
| | | | | Iron | 6.40E-03 | µg/m³ | 6.26E-06 | µg/m³ | -- | -- | -- | 4.38E-05 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 7.85E-11 | µg/m³ | -- | -- | -- | 5.49E-10 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-10 | | | | | 0.00002 |
| | | Exp. Point Total | | | | | | | | | 3E-10 | | | | | 0.00002 |
| | Exp. Medium Total | | | | | | | | | | 3E-10 | | | | | 0.00002 |
| Medium Total | | | | | | | | | | | 3E-07 | | | | | 0.02 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 3E-07 | | | | | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-8.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 9.46E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.009 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.75E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.80E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 7.15E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.009 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.50E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.16E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.38E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.002 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.44E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.13E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0002 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.42E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.81E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00004 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.66E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000003 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.68E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.37E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000009 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.37E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.72E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.00007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.00007 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.05 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.05 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-9.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.87E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0009 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0005 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.21E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.63E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.70E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.40E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 5.71E-06 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.000006 |
| | | | | Arsenic | 2.96E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.40E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.28E-09 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.00007 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.69E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.000006 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 4.31E-06 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.000006 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.40E-11 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.000005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.004 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.004 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.81E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00004 |
| | | | | Arsenic | 2.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.66E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000003 |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.68E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.37E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000009 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.37E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.72E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.00007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.00007 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.004 |
| Notes: | | | | | | | | | Total of Receptor Risks Across All Media | | -- | | | Total of Receptor Hazards Across All Media | | 0.004 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-10.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Surface Soil | Surface Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.00E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.96E+00 | mg/kg | 1.39E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.16E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.67E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 6.80E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.52E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-06 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.34E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.96E+00 | mg/kg | 1.03E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 7.27E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.97E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 1.01E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.27E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-06 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.97E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.18E-06 | µg/m³ | 5.06E-08 | µg/m³ | 4.30E-03 | m³/µg | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 7.83E-06 | µg/m³ | 1.72E-07 | µg/m³ | 1.20E-02 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 5.83E-08 | µg/m³ | 9.00E-03 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Iron | 6.40E-03 | µg/m³ | 1.49E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.86E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-09 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 3E-09 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 3E-09 | | | | | -- |
| Medium Total | | | | | | | | | | | 7E-06 | | | | | -- |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 7E-06 | | | | Total of Receptor Hazards Across All Media | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-11.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 1.15E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 7E-08 | 1.20E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.52E-06 | mg/kg-day | -- | -- | -- | 3.68E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.007 |
| | | | | Benzene | 1.61E+00 | mg/kg | 6.58E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 4E-09 | 6.88E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 3.20E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 4E-09 | 3.35E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00003 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.19E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-08 | 1.25E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00006 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 7.80E-07 | mg/kg-day | -- | -- | -- | 8.15E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 2.57E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-08 | 2.68E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 9.42E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 9E-07 | 9.85E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.74E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-08 | 2.86E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.59E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-08 | 1.66E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.90E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 1.98E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 4.30E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 1E-09 | 4.49E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 1.06E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 1.10E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 6.80E-04 | mg/kg-day | -- | -- | -- | 7.10E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.007 |
| | | | | Antimony | 8.07E+01 | mg/kg | 3.31E-06 | mg/kg-day | -- | -- | -- | 3.45E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.09 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 2.39E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | 2.50E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 8.26E-07 | mg/kg-day | -- | -- | -- | 8.63E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.009 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 2.18E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-06 | 2.27E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.008 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.69E-07 | mg/kg-day | -- | -- | -- | 2.81E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Copper | 2.32E+03 | mg/kg | 9.49E-05 | mg/kg-day | -- | -- | -- | 9.91E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.03 |
| | | | | Iron | 5.68E+04 | mg/kg | 2.33E-03 | mg/kg-day | -- | -- | -- | 2.43E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.03 |
| | | | | Manganese | 5.63E+02 | mg/kg | 2.31E-05 | mg/kg-day | -- | -- | -- | 2.41E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.01 |
| | | | | Mercury | 7.85E-01 | mg/kg | 3.22E-08 | mg/kg-day | -- | -- | -- | 3.36E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.002 |
| | | | | Nickel | 5.02E+02 | mg/kg | 2.06E-05 | mg/kg-day | -- | -- | -- | 2.15E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.01 |
| | | | | Silver | 2.05E+01 | mg/kg | 8.42E-07 | mg/kg-day | -- | -- | -- | 8.79E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Thallium | 8.63E-02 | mg/kg | 3.54E-09 | mg/kg-day | -- | -- | -- | 3.69E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 8.72E-07 | mg/kg-day | -- | -- | -- | 9.11E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.002 |
| | | | | Zinc | 1.92E+03 | mg/kg | 7.87E-05 | mg/kg-day | -- | -- | -- | 8.22E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | 0.3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 4.86E-08 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 3E-09 | 5.07E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 1.49E-07 | mg/kg-day | -- | -- | -- | 1.56E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0003 |
| | | | | Benzene | 1.61E+00 | mg/kg | 4.64E-11 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-12 | 4.85E-10 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.36E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-10 | 1.42E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 5.05E-09 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 6E-10 | 5.27E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000003 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 3.30E-08 | mg/kg-day | -- | -- | -- | 3.45E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 4.71E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-09 | 4.92E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 1.73E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-07 | 1.81E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 5.03E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-09 | 5.25E-07 | mg/kg-day | -- | -- | -- |

Table 7-11.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 2.92E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-09 | 3.05E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 3.48E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-09 | 3.64E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 6.07E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 1E-10 | 6.34E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 4.47E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 6E-09 | 4.67E-13 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.0007 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 9.59E-06 | mg/kg-day | -- | -- | -- | 1.00E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Antimony | 8.07E+01 | mg/kg | 4.66E-08 | mg/kg-day | -- | -- | -- | 4.87E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.008 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.69E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-08 | 1.76E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.17E-09 | mg/kg-day | -- | -- | -- | 1.22E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0005 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 3.07E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 6E-07 | 3.21E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.004 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 3.79E-09 | mg/kg-day | -- | -- | -- | 3.96E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Copper | 2.32E+03 | mg/kg | 1.34E-06 | mg/kg-day | -- | -- | -- | 1.40E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0004 |
| | | | | Iron | 5.68E+04 | mg/kg | 3.28E-05 | mg/kg-day | -- | -- | -- | 3.43E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0005 |
| | | | | Manganese | 5.63E+02 | mg/kg | 3.26E-07 | mg/kg-day | -- | -- | -- | 3.40E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.004 |
| | | | | Mercury | 7.85E-01 | mg/kg | 4.54E-10 | mg/kg-day | -- | -- | -- | 4.74E-09 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 2.90E-07 | mg/kg-day | -- | -- | -- | 3.03E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.004 |
| | | | | Silver | 2.05E+01 | mg/kg | 1.19E-08 | mg/kg-day | -- | -- | -- | 1.24E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0006 |
| | | | | Thallium | 8.63E-02 | mg/kg | 4.99E-11 | mg/kg-day | -- | -- | -- | 5.21E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00005 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.23E-08 | mg/kg-day | -- | -- | -- | 1.28E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.001 |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.11E-06 | mg/kg-day | -- | -- | -- | 1.16E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00004 |
| | | | Exp. Route Total | | | | | | | | 8E-07 | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | 4E-06 | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | 4E-06 | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 2.25E-07 | µg/m³ | 1.60E-05 | m³/µg | 4E-12 | 2.35E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00001 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 6.91E-07 | µg/m³ | -- | -- | -- | 7.22E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | 1.29E-08 | µg/m³ | 7.80E-06 | m³/µg | 1E-13 | 1.35E-07 | µg/m³ | 3.00E+01 | µg/m³ | 4E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 6.28E-08 | µg/m³ | 2.50E-06 | m³/µg | 2E-13 | 6.57E-07 | µg/m³ | 1.00E+03 | µg/m³ | 7E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 2.34E-08 | µg/m³ | 3.40E-05 | m³/µg | 8E-13 | 2.44E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000008 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 1.53E-07 | µg/m³ | -- | -- | -- | 1.60E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 5.04E-08 | µg/m³ | 6.00E-05 | m³/µg | 3E-12 | 5.27E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 1.85E-07 | µg/m³ | 6.00E-04 | m³/µg | 1E-10 | 1.93E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.001 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 5.38E-08 | µg/m³ | 6.00E-05 | m³/µg | 3E-12 | 5.62E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 3.12E-09 | µg/m³ | 6.00E-04 | m³/µg | 2E-12 | 3.26E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 3.73E-08 | µg/m³ | 6.00E-05 | m³/µg | 2E-12 | 3.89E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 8.44E-10 | µg/m³ | 6.90E-05 | m³/µg | 6E-14 | 8.82E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 2.07E-13 | µg/m³ | 3.80E+01 | m³/µg | 8E-12 | 2.17E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 1.33E-04 | µg/m³ | -- | -- | -- | 1.39E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0003 |
| | | | | Antimony | 5.93E-05 | µg/m³ | 6.48E-07 | µg/m³ | -- | -- | -- | 6.77E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 7.83E-08 | µg/m³ | 4.30E-03 | m³/µg | 3E-10 | 8.18E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00005 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 1.62E-07 | µg/m³ | 1.80E-03 | m³/µg | 3E-10 | 1.69E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0002 |

Table 7-11.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 4.27E-07 | µg/m³ | 1.20E-02 | m³/µg | 5E-09 | 4.46E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0006 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 5.27E-08 | µg/m³ | 9.00E-03 | m³/µg | 5E-10 | 5.50E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00009 |
| | | | | Copper | 1.70E-03 | µg/m³ | 1.86E-05 | µg/m³ | -- | -- | -- | 1.94E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 4.57E-04 | µg/m³ | -- | -- | -- | 4.77E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 4.53E-06 | µg/m³ | -- | -- | -- | 4.73E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0009 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 6.31E-09 | µg/m³ | -- | -- | -- | 6.59E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 4.04E-06 | µg/m³ | 2.60E-04 | m³/µg | 1E-09 | 4.22E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0005 |
| | | | | Silver | 1.51E-05 | µg/m³ | 1.65E-07 | µg/m³ | -- | -- | -- | 1.72E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 6.94E-10 | µg/m³ | -- | -- | -- | 7.25E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.71E-07 | µg/m³ | -- | -- | -- | 1.79E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00002 |
| | | | | Zinc | 1.41E-03 | µg/m³ | 1.54E-05 | µg/m³ | -- | -- | -- | 1.61E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 7E-09 | | | | | 0.004 |
| | | Exp. Point Total | | | | | | | | | 7E-09 | | | | | 0.004 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.41E+00 | µg/m³ | 2.63E-02 | µg/m³ | 1.60E-05 | m³/µg | 4E-07 | 2.75E-01 | µg/m³ | 2.00E-01 | µg/m³ | 1 |
| | | | | 2-Hexanone | 3.75E+00 | µg/m³ | 4.09E-02 | µg/m³ | -- | -- | -- | 4.28E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.80E-01 | µg/m³ | 3.05E-03 | µg/m³ | 7.80E-06 | m³/µg | 2E-08 | 3.19E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.001 |
| | | | | Ethylbenzene | 8.03E-01 | µg/m³ | 8.77E-03 | µg/m³ | 2.50E-06 | m³/µg | 2E-08 | 9.17E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00009 |
| | | | | Naphthalene | 3.55E-02 | µg/m³ | 3.88E-04 | µg/m³ | 3.40E-05 | m³/µg | 1E-08 | 4.05E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.001 |
| | | | | Xylenes, Total | 1.70E+00 | µg/m³ | 1.86E-02 | µg/m³ | -- | -- | -- | 1.94E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.97E-04 | µg/m³ | 4.33E-06 | µg/m³ | 6.00E-05 | m³/µg | 3E-10 | 4.53E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.29E-09 | µg/m³ | 5.78E-11 | µg/m³ | 3.80E+01 | m³/µg | 2E-09 | 6.04E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 5E-07 | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | 5E-07 | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | 5E-07 | | | | | 1 |
| Medium Total | | | | | | | | | | | 4E-06 | | | | | 2 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.90E-07 | µg/m³ | 2.60E-05 | m³/µg | 5E-12 | 1.98E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000003 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 7.19E-05 | µg/m³ | 7.80E-06 | m³/µg | 6E-10 | 7.52E-04 | µg/m³ | 3.00E+01 | µg/m³ | 0.00003 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 1.44E-07 | µg/m³ | 2.30E-05 | m³/µg | 3E-12 | 1.51E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000002 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.83E-06 | µg/m³ | -- | -- | -- | 1.92E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 8.04E-05 | µg/m³ | 2.50E-06 | m³/µg | 2E-10 | 8.40E-04 | µg/m³ | 1.00E+03 | µg/m³ | 0.0000008 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 8.30E-06 | µg/m³ | -- | -- | -- | 8.67E-05 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000002 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 3.43E-06 | µg/m³ | 3.40E-05 | m³/µg | 1E-10 | 3.58E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00001 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 1.40E-06 | µg/m³ | 2.60E-07 | m³/µg | 4E-13 | 1.46E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000004 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 2.55E-04 | µg/m³ | -- | -- | -- | 2.67E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.0000005 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 2.73E-07 | µg/m³ | 4.10E-06 | m³/µg | 1E-12 | 2.85E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000001 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 2.15E-04 | µg/m³ | -- | -- | -- | 2.24E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 5.18E-08 | µg/m³ | -- | -- | -- | 5.41E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000001 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 8.71E-07 | µg/m³ | -- | -- | -- | 9.10E-06 | µg/m³ | 3.00E+00 | µg/m³ | 0.000003 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 4.95E-11 | µg/m³ | 6.00E-05 | m³/µg | 3E-15 | 5.17E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 9.85E-09 | µg/m³ | -- | -- | -- | 1.03E-07 | µg/m³ | -- | -- | -- |

Table 7-11.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 1.08E-13 | µg/m³ | 3.80E+01 | m³/µg | 4E-12 | 1.13E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 1.45E-08 | µg/m³ | -- | -- | -- | 1.52E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000005 |
| | | | Exp. Route Total | | | | | | | | 9E-10 | | | | | 0.00007 |
| | | Exp. Point Total | | | | | | | | | 9E-10 | | | | | 0.00007 |
| | Exp. Medium Total | | | | | | | | | | 9E-10 | | | | | 0.00007 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 9.28E-03 | µg/m³ | 2.60E-05 | m³/µg | 2E-07 | 9.69E-02 | µg/m³ | 7.00E+00 | µg/m³ | 0.01 |
| | | | | Benzene | 4.76E+02 | µg/m³ | 5.20E+00 | µg/m³ | 7.80E-06 | m³/µg | 4E-05 | 5.43E+01 | µg/m³ | 3.00E+01 | µg/m³ | 2 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 3.28E+01 | µg/m³ | -- | -- | -- | 3.42E+02 | µg/m³ | 6.00E+03 | µg/m³ | 0.06 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 4.58E+00 | µg/m³ | 2.50E-06 | m³/µg | 1E-05 | 4.78E+01 | µg/m³ | 1.00E+03 | µg/m³ | 0.05 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 4.68E-01 | µg/m³ | -- | -- | -- | 4.89E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.01 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 2.36E-02 | µg/m³ | 3.40E-05 | m³/µg | 8E-07 | 2.47E-01 | µg/m³ | 3.00E+00 | µg/m³ | 0.08 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 1.10E-01 | µg/m³ | 2.60E-07 | m³/µg | 3E-08 | 1.15E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.03 |
| | | | | Toluene | 2.66E+03 | µg/m³ | 2.91E+01 | µg/m³ | -- | -- | -- | 3.04E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.06 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 1.58E-02 | µg/m³ | 4.10E-06 | m³/µg | 6E-08 | 1.66E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.08 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 1.42E+01 | µg/m³ | -- | -- | -- | 1.48E+02 | µg/m³ | 1.00E+02 | µg/m³ | 1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 7.57E-04 | µg/m³ | -- | -- | -- | 7.91E-03 | µg/m³ | 4.00E-01 | µg/m³ | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 1.16E-03 | µg/m³ | -- | -- | -- | 1.21E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.04 |
| | | | Exp. Route Total | | | | | | | | 5E-05 | | | | | 4 |
| | | Exp. Point Total | | | | | | | | | 5E-05 | | | | | 4 |
| | Exp. Medium Total | | | | | | | | | | 5E-05 | | | | | 4 |
| Medium Total | | | | | | | | | | | 5E-05 | | | | | 4 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 5 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-12.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 8.56E-08 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 5E-09 | 1.20E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.63E-07 | mg/kg-day | -- | -- | -- | 3.68E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.007 |
| | | | | Benzene | 1.61E+00 | mg/kg | 4.91E-09 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-10 | 6.88E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00007 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.39E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-10 | 3.35E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.00007 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 8.90E-09 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-09 | 1.25E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 5.82E-08 | mg/kg-day | -- | -- | -- | 8.15E-06 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.92E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-09 | 2.68E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 7.03E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-08 | 9.85E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.05E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-09 | 2.86E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.19E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-09 | 1.66E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.42E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-09 | 1.98E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 3.21E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 8E-11 | 4.49E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 7.89E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-08 | 1.10E-11 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.0006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 5.07E-05 | mg/kg-day | -- | -- | -- | 7.10E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.007 |
| | | | | Antimony | 8.07E+01 | mg/kg | 2.47E-07 | mg/kg-day | -- | -- | -- | 3.45E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.09 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.79E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-08 | 2.50E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0005 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 6.16E-08 | mg/kg-day | -- | -- | -- | 8.63E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.62E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 8E-08 | 2.27E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.005 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.00E-08 | mg/kg-day | -- | -- | -- | 2.81E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0009 |
| | | | | Copper | 2.32E+03 | mg/kg | 7.08E-06 | mg/kg-day | -- | -- | -- | 9.91E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.1 |
| | | | | Iron | 5.68E+04 | mg/kg | 1.74E-04 | mg/kg-day | -- | -- | -- | 2.43E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.03 |
| | | | | Manganese | 5.63E+02 | mg/kg | 1.72E-06 | mg/kg-day | -- | -- | -- | 2.41E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.01 |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.40E-09 | mg/kg-day | -- | -- | -- | 3.36E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.53E-06 | mg/kg-day | -- | -- | -- | 2.15E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.01 |
| | | | | Silver | 2.05E+01 | mg/kg | 6.28E-08 | mg/kg-day | -- | -- | -- | 8.79E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Thallium | 8.63E-02 | mg/kg | 2.64E-10 | mg/kg-day | -- | -- | -- | 3.69E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.0009 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 6.50E-08 | mg/kg-day | -- | -- | -- | 9.11E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0009 |
| | | | | Zinc | 1.92E+03 | mg/kg | 5.87E-06 | mg/kg-day | -- | -- | -- | 8.22E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 9.06E-09 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 5E-10 | 1.27E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.78E-08 | mg/kg-day | -- | -- | -- | 3.90E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0008 |
| | | | | Benzene | 1.61E+00 | mg/kg | 8.66E-12 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 5E-13 | 1.21E-09 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.53E-09 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-11 | 3.54E-07 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.000007 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 9.41E-10 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-10 | 1.32E-07 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0000002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 6.16E-09 | mg/kg-day | -- | -- | -- | 8.62E-07 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.000002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 8.79E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-10 | 1.23E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 3.22E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-08 | 4.51E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 9.38E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-10 | 1.31E-06 | mg/kg-day | -- | -- | -- |

Table 7-12.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 5.44E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-10 | 7.62E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 6.50E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-10 | 9.10E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.13E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-11 | 1.59E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 8.35E-15 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-09 | 1.17E-12 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.00006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.79E-06 | mg/kg-day | -- | -- | -- | 2.50E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0003 |
| | | | | Antimony | 8.07E+01 | mg/kg | 8.70E-09 | mg/kg-day | -- | -- | -- | 1.22E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.02 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 3.15E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-09 | 4.41E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00009 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.17E-10 | mg/kg-day | -- | -- | -- | 3.04E-08 | mg/kg-day | 1.25E-05 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 5.73E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-07 | 8.02E-07 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.006 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 7.07E-10 | mg/kg-day | -- | -- | -- | 9.90E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00003 |
| | | | | Copper | 2.32E+03 | mg/kg | 2.50E-07 | mg/kg-day | -- | -- | -- | 3.50E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.003 |
| | | | | Iron | 5.68E+04 | mg/kg | 6.13E-06 | mg/kg-day | -- | -- | -- | 8.58E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Manganese | 5.63E+02 | mg/kg | 6.07E-08 | mg/kg-day | -- | -- | -- | 8.50E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.009 |
| | | | | Mercury | 7.85E-01 | mg/kg | 8.47E-11 | mg/kg-day | -- | -- | -- | 1.19E-08 | mg/kg-day | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 5.41E-08 | mg/kg-day | -- | -- | -- | 7.58E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.009 |
| | | | | Silver | 2.05E+01 | mg/kg | 2.22E-09 | mg/kg-day | -- | -- | -- | 3.10E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.002 |
| | | | | Thallium | 8.63E-02 | mg/kg | 9.31E-12 | mg/kg-day | -- | -- | -- | 1.30E-09 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.00003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.29E-09 | mg/kg-day | -- | -- | -- | 3.21E-07 | mg/kg-day | 2.60E-04 | mg/kg-day | 0.001 |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.07E-07 | mg/kg-day | -- | -- | -- | 2.90E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.07 |
| | | Exp. Point Total | | | | | | | | | 4E-07 | | | | | 0.4 |
| | Exp. Medium Total | | | | | | | | | | 4E-07 | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.64E-03 | µg/m³ | 2.15E-06 | µg/m³ | 1.60E-05 | m³/µg | 3E-11 | 3.01E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0002 |
| | | | | 2-Hexanone | 8.10E-03 | µg/m³ | 6.60E-06 | µg/m³ | -- | -- | -- | 9.25E-04 | µg/m³ | 3.00E+01 | µg/m³ | 0.00003 |
| | | | | Benzene | 1.51E-04 | µg/m³ | 1.23E-07 | µg/m³ | 7.80E-06 | m³/µg | 1E-12 | 1.73E-05 | µg/m³ | 8.00E+01 | µg/m³ | 0.0000002 |
| | | | | Ethylbenzene | 7.36E-04 | µg/m³ | 6.00E-07 | µg/m³ | 2.50E-06 | m³/µg | 2E-12 | 8.40E-05 | µg/m³ | 9.00E+03 | µg/m³ | 9E-09 |
| | | | | Naphthalene | 2.74E-04 | µg/m³ | 2.23E-07 | µg/m³ | 3.40E-05 | m³/µg | 8E-12 | 3.13E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00001 |
| | | | | Xylenes, Total | 1.79E-03 | µg/m³ | 1.46E-06 | µg/m³ | -- | -- | -- | 2.05E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000005 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 5.91E-04 | µg/m³ | 4.82E-07 | µg/m³ | 6.00E-05 | m³/µg | 3E-11 | 6.74E-05 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.17E-03 | µg/m³ | 1.77E-06 | µg/m³ | 6.00E-04 | m³/µg | 1E-09 | 2.47E-04 | µg/m³ | 2.00E-03 | µg/m³ | 0.1 |
| | | | | Benzo(b)fluoranthene | 6.30E-04 | µg/m³ | 5.14E-07 | µg/m³ | 6.00E-05 | m³/µg | 3E-11 | 7.19E-05 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.65E-05 | µg/m³ | 2.98E-08 | µg/m³ | 6.00E-04 | m³/µg | 2E-11 | 4.17E-06 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.37E-04 | µg/m³ | 3.56E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | 4.98E-05 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 9.89E-06 | µg/m³ | 8.06E-09 | µg/m³ | 6.90E-05 | m³/µg | 6E-13 | 1.13E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.43E-09 | µg/m³ | 1.98E-12 | µg/m³ | 3.80E+01 | m³/µg | 8E-11 | 2.77E-10 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.56E+00 | µg/m³ | 1.27E-03 | µg/m³ | -- | -- | -- | 1.78E-01 | µg/m³ | 5.00E+00 | µg/m³ | 0.04 |
| | | | | Antimony | 7.60E-03 | µg/m³ | 6.19E-06 | µg/m³ | -- | -- | -- | 8.67E-04 | µg/m³ | 1.00E+00 | µg/m³ | 0.0009 |
| | | | | Arsenic | 9.17E-04 | µg/m³ | 7.48E-07 | µg/m³ | 4.30E-03 | m³/µg | 3E-09 | 1.05E-04 | µg/m³ | 1.50E-02 | µg/m³ | 0.007 |
| | | | | Cadmium (Diet) | 1.90E-03 | µg/m³ | 1.55E-06 | µg/m³ | 1.80E-03 | m³/µg | 3E-09 | 2.17E-04 | µg/m³ | 9.00E-01 | µg/m³ | 0.0002 |

Table 7-12.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 5.00E-03 | µg/m³ | 4.08E-06 | µg/m³ | 1.20E-02 | m³/µg | 5E-08 | 5.71E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.002 |
| | | | | Cobalt | 6.17E-04 | µg/m³ | 5.03E-07 | µg/m³ | 9.00E-03 | m³/µg | 5E-09 | 7.05E-05 | µg/m³ | 2.00E-02 | µg/m³ | 0.004 |
| | | | | Copper | 2.18E-01 | µg/m³ | 1.78E-04 | µg/m³ | -- | -- | -- | 2.49E-02 | µg/m³ | -- | -- | -- |
| | | | | Iron | 5.35E+00 | µg/m³ | 4.36E-03 | µg/m³ | -- | -- | -- | 6.11E-01 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 5.30E-02 | µg/m³ | 4.33E-05 | µg/m³ | -- | -- | -- | 6.06E-03 | µg/m³ | 5.00E-02 | µg/m³ | 0.1 |
| | | | | Mercury | 7.39E-05 | µg/m³ | 6.03E-08 | µg/m³ | -- | -- | -- | 8.44E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00003 |
| | | | | Nickel | 4.73E-02 | µg/m³ | 3.85E-05 | µg/m³ | 2.60E-04 | m³/µg | 1E-08 | 5.40E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.03 |
| | | | | Silver | 1.93E-03 | µg/m³ | 1.58E-06 | µg/m³ | -- | -- | -- | 2.21E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.13E-06 | µg/m³ | 6.63E-09 | µg/m³ | -- | -- | -- | 9.28E-07 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 2.00E-03 | µg/m³ | 1.63E-06 | µg/m³ | -- | -- | -- | 2.29E-04 | µg/m³ | -- | -- | -- |
| | | | | Zinc | 1.81E-01 | µg/m³ | 1.48E-04 | µg/m³ | -- | -- | -- | 2.07E-02 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 7E-08 | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | 7E-08 | | | | | 0.3 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 1.46E+01 | µg/m³ | 1.19E-02 | µg/m³ | 1.60E-05 | m³/µg | 2E-07 | 1.66E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.8 |
| | | | | 2-Hexanone | 2.27E+01 | µg/m³ | 1.85E-02 | µg/m³ | -- | -- | -- | 2.59E+00 | µg/m³ | 3.00E+01 | µg/m³ | 0.09 |
| | | | | Benzene | 1.69E+00 | µg/m³ | 1.38E-03 | µg/m³ | 7.80E-06 | m³/µg | 1E-08 | 1.93E-01 | µg/m³ | 8.00E+01 | µg/m³ | 0.002 |
| | | | | Ethylbenzene | 4.87E+00 | µg/m³ | 3.97E-03 | µg/m³ | 2.50E-06 | m³/µg | 1E-08 | 5.55E-01 | µg/m³ | 9.00E+03 | µg/m³ | 0.00006 |
| | | | | Naphthalene | 2.15E-01 | µg/m³ | 1.75E-04 | µg/m³ | 3.40E-05 | m³/µg | 6E-09 | 2.46E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.008 |
| | | | | Xylenes, Total | 1.03E+01 | µg/m³ | 8.41E-03 | µg/m³ | -- | -- | -- | 1.18E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 2.40E-03 | µg/m³ | 1.96E-06 | µg/m³ | 6.00E-05 | m³/µg | 1E-10 | 2.74E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 3.21E-08 | µg/m³ | 2.62E-11 | µg/m³ | 3.80E+01 | m³/µg | 1E-09 | 3.66E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.9 |
| | | Exp. Point Total | | | | | | | | | 2E-07 | | | | | 0.9 |
| | Exp. Medium Total | | | | | | | | | | 3E-07 | | | | | 1 |
| Medium Total | | | | | | | | | | | 6E-07 | | | | | 2 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 4.82E-10 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 4E-11 | 6.75E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000003 |
| | | | | Benzene | 2.88E-01 | mg/L | 9.26E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 5E-09 | 1.30E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.001 |
| | | | | Chloroform | 7.20E-04 | mg/L | 2.31E-10 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 7E-12 | 3.24E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000003 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 2.60E-09 | mg/kg-day | -- | -- | -- | 3.63E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 1.15E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-09 | 1.60E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0003 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 1.14E-08 | mg/kg-day | -- | -- | -- | 1.59E-06 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.000004 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 1.78E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 2E-09 | 2.50E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000004 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 1.35E-09 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 3E-12 | 1.89E-07 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00002 |
| | | | | Toluene | 1.09E+00 | mg/L | 3.49E-07 | mg/kg-day | -- | -- | -- | 4.89E-05 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.00006 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 2.93E-10 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 1E-11 | 4.10E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00008 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 3.81E-07 | mg/kg-day | -- | -- | -- | 5.33E-05 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 4.41E-10 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 4E-12 | 6.18E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000006 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 5.35E-09 | mg/kg-day | -- | -- | -- | 7.49E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 5.04E-11 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-12 | 7.06E-09 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 4.30E-11 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-11 | 6.02E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00002 |

Table 7-12.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 4.14E-11 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-12 | 5.80E-09 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 1.54E-10 | mg/kg-day | -- | -- | -- | 2.16E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 6.70E-15 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 9E-10 | 9.37E-13 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.00005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 3.09E-06 | mg/kg-day | -- | -- | -- | 4.33E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0004 |
| | | | | Antimony | 1.00E-03 | mg/L | 3.21E-10 | mg/kg-day | -- | -- | -- | 4.49E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.0001 |
| | | | | Arsenic | 8.07E-03 | mg/L | 2.59E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-09 | 3.63E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00007 |
| | | | | Barium | 5.29E-02 | mg/L | 1.70E-08 | mg/kg-day | -- | -- | -- | 2.38E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | Beryllium | 5.60E-03 | mg/L | 1.80E-09 | mg/kg-day | -- | -- | -- | 2.52E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00005 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 2.16E-10 | mg/kg-day | -- | -- | -- | 3.03E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00006 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 4.00E-09 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-09 | 5.60E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Cobalt | 7.19E-03 | mg/L | 2.31E-09 | mg/kg-day | -- | -- | -- | 3.23E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0001 |
| | | | | Iron | 1.47E+01 | mg/L | 4.71E-06 | mg/kg-day | -- | -- | -- | 6.59E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0009 |
| | | | | Manganese | 7.38E-01 | mg/L | 2.37E-07 | mg/kg-day | -- | -- | -- | 3.32E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.001 |
| | | | | Mercury | 1.30E-04 | mg/L | 4.17E-11 | mg/kg-day | -- | -- | -- | 5.84E-09 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 4.17E-10 | mg/kg-day | -- | -- | -- | 5.84E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.001 |
| | | | | Vanadium | 1.08E-02 | mg/L | 3.47E-09 | mg/kg-day | -- | -- | -- | 4.86E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00005 |
| | | | | Zinc | 1.05E-01 | mg/L | 3.36E-08 | mg/kg-day | -- | -- | -- | 4.71E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | 0.007 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 9.29E-10 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 8E-11 | 1.30E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000007 |
| | | | | Benzene | 2.88E-01 | mg/L | 5.81E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-08 | 8.13E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.008 |
| | | | | Chloroform | 7.20E-04 | mg/L | 7.83E-10 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-11 | 1.10E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000001 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.29E-08 | mg/kg-day | -- | -- | -- | 1.80E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00009 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 2.52E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-08 | 3.53E-04 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.007 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 4.78E-07 | mg/kg-day | -- | -- | -- | 6.69E-05 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0002 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 4.16E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-08 | 5.82E-05 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0001 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 2.79E-08 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 6E-11 | 3.91E-06 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.0005 |
| | | | | Toluene | 1.09E+00 | mg/L | 4.67E-06 | mg/kg-day | -- | -- | -- | 6.54E-04 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.0008 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.77E-09 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 8E-11 | 2.48E-07 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0005 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 8.49E-06 | mg/kg-day | -- | -- | -- | 1.19E-03 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 2.47E-08 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 2E-10 | 3.46E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00003 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.66E-07 | mg/kg-day | -- | -- | -- | 3.73E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.009 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 9.46E-09 | mg/kg-day | -- | -- | -- | 1.32E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.04E-06 | mg/kg-day | -- | -- | -- | 1.45E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Antimony | 1.00E-03 | mg/L | 1.08E-10 | mg/kg-day | -- | -- | -- | 1.51E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.0003 |
| | | | | Arsenic | 8.07E-03 | mg/L | 8.70E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-09 | 1.22E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00002 |
| | | | | Barium | 5.29E-02 | mg/L | 5.71E-09 | mg/kg-day | -- | -- | -- | 7.99E-07 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.00006 |
| | | | | Beryllium | 5.60E-03 | mg/L | 6.04E-10 | mg/kg-day | -- | -- | -- | 8.46E-08 | mg/kg-day | 3.50E-05 | mg/kg-day | 0.002 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 7.26E-11 | mg/kg-day | -- | -- | -- | 1.02E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0004 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 2.69E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 5E-08 | 3.76E-07 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.003 |
| | | | | Cobalt | 7.19E-03 | mg/L | 3.10E-10 | mg/kg-day | -- | -- | -- | 4.34E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00001 |
| | | | | Iron | 1.47E+01 | mg/L | 1.58E-06 | mg/kg-day | -- | -- | -- | 2.21E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0003 |
| | | | | Manganese | 7.38E-01 | mg/L | 7.95E-08 | mg/kg-day | -- | -- | -- | 1.11E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.01 |

Table 7-12.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 1.30E-04 | mg/L | 1.40E-11 | mg/kg-day | -- | -- | -- | 1.96E-09 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.40E-10 | mg/kg-day | -- | -- | -- | 1.96E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 1.08E-02 | mg/L | 1.17E-09 | mg/kg-day | -- | -- | -- | 1.63E-07 | mg/kg-day | 2.60E-04 | mg/kg-day | 0.0006 |
| | | | | Zinc | 1.05E-01 | mg/L | 6.78E-09 | mg/kg-day | -- | -- | -- | 9.49E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000003 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | 2E-07 | | | | | 0.06 |
| | Exp. Medium Total | | | | | | | | | | 2E-07 | | | | | 0.06 |
| | Outdoor Air | Trench (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.19E+01 | µg/m³ | 2.52E-03 | µg/m³ | 2.60E-05 | m³/µg | 7E-08 | 3.53E-01 | µg/m³ | 7.00E+01 | µg/m³ | 0.005 |
| | | | | Benzene | 2.69E+03 | µg/m³ | 5.71E-01 | µg/m³ | 7.80E-06 | m³/µg | 4E-06 | 8.00E+01 | µg/m³ | 8.00E+01 | µg/m³ | 1 |
| | | | | Chloroform | 5.42E+00 | µg/m³ | 1.15E-03 | µg/m³ | 2.30E-05 | m³/µg | 3E-08 | 1.61E-01 | µg/m³ | 2.44E+02 | µg/m³ | 0.0007 |
| | | | | cis-1,2-Dichloroethene | 6.76E+01 | µg/m³ | 1.43E-02 | µg/m³ | -- | -- | -- | 2.01E+00 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 2.87E+03 | µg/m³ | 6.09E-01 | µg/m³ | 2.50E-06 | m³/µg | 2E-06 | 8.52E+01 | µg/m³ | 9.00E+03 | µg/m³ | 0.009 |
| | | | | Isopropylbenzene | 2.70E+02 | µg/m³ | 5.72E-02 | µg/m³ | -- | -- | -- | 8.01E+00 | µg/m³ | 9.00E+01 | µg/m³ | 0.09 |
| | | | | Naphthalene | 3.67E+02 | µg/m³ | 7.78E-02 | µg/m³ | 3.40E-05 | m³/µg | 3E-06 | 1.09E+01 | µg/m³ | 3.00E+00 | µg/m³ | 4 |
| | | | | Tetrachloroethene | 2.72E+01 | µg/m³ | 5.76E-03 | µg/m³ | 2.60E-07 | m³/µg | 1E-09 | 8.06E-01 | µg/m³ | 4.07E+01 | µg/m³ | 0.02 |
| | | | | Toluene | 9.37E+03 | µg/m³ | 1.99E+00 | µg/m³ | -- | -- | -- | 2.78E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.06 |
| | | | | Trichloroethene | 6.62E+00 | µg/m³ | 1.40E-03 | µg/m³ | 4.10E-06 | m³/µg | 6E-09 | 1.96E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.1 |
| | | | | Xylenes, Total | 9.51E+03 | µg/m³ | 2.02E+00 | µg/m³ | -- | -- | -- | 2.82E+02 | µg/m³ | 4.00E+02 | µg/m³ | 0.7 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 7.81E+00 | µg/m³ | 1.66E-03 | µg/m³ | -- | -- | -- | 2.32E-01 | µg/m³ | 4.00E+00 | µg/m³ | 0.06 |
| | | | | 2-Methylnaphthalene | 1.05E+02 | µg/m³ | 2.24E-02 | µg/m³ | -- | -- | -- | 3.13E+00 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.31E-02 | µg/m³ | 1.12E-05 | µg/m³ | 6.00E-05 | m³/µg | 7E-10 | 1.57E-03 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 5.84E-01 | µg/m³ | 1.24E-04 | µg/m³ | -- | -- | -- | 1.73E-02 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 6.01E-05 | µg/m³ | 1.28E-08 | µg/m³ | 3.80E+01 | m³/µg | 5E-07 | 1.79E-06 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.63E-01 | µg/m³ | 1.62E-04 | µg/m³ | -- | -- | -- | 2.26E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.08 |
| | | | Exp. Route Total | | | | | | | | 9E-06 | | | | | 6 |
| | | Exp. Point Total | | | | | | | | | 9E-06 | | | | | 6 |
| | Exp. Medium Total | | | | | | | | | | 9E-06 | | | | | 6 |
| Medium Total | | | | | | | | | | | 9E-06 | | | | | 6 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media 1E-05 | | | | | Total of Receptor Hazards Across All Media 7 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-13.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.07E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.03 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.30E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.07 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 6.16E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0003 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.12E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.30E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.41E-05 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.82E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.3 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.57E-05 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.49E-06 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.78E-05 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.03E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 9.90E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.1 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 6.36E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.06 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.09E-04 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.8 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.24E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.07 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.73E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.08 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.04E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.07 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.51E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.08 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 8.88E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.3 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.18E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.3 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.16E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.09 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.01E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.02 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.93E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.1 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.88E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.02 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 3.31E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.03 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.16E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.02 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 7.37E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.10E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.57E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.87E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.42E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.30E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00003 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.46E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.95E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.81E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.06 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.28E-06 | mg/kg-day | -- | -- | -- |

Table 7-13.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.06E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.66E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.37E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 4.70E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.007 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.90E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.08 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.77E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.22E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.22E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.04 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.98E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.41E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.004 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 3.45E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.42E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.04 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.76E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.05E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.04 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.25E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.006 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 5.24E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.29E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.01 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.17E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 2.06E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00001 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 6.32E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.18E-07 | µg/m³ | 3.00E+01 | µg/m³ | 4E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.74E-07 | µg/m³ | 1.00E+03 | µg/m³ | 6E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.14E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000007 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.40E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.61E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.69E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.0008 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.92E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.85E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.41E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 7.72E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.90E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.22E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.93E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.16E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00005 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.48E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0001 |

Table 7-13.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.90E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0005 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.82E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00008 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.70E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.17E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 4.14E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0008 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 5.77E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.69E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0004 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.51E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.34E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.56E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00002 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.41E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.36E-01 | µg/m³ | 2.00E-01 | µg/m³ | 1 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.67E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.74E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.0009 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 7.86E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00008 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.48E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.001 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.67E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.88E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 5.18E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | | | | | -- | | | | | 4 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.02E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 3.87E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 1 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 9.67E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.001 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 1.09E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.05 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 4.79E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.05 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 4.75E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.005 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 7.46E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.04 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.64E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.009 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.46E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.2 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 1.23E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.02 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 1.59E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.08 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 1.84E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00004 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 2.24E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.06 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 2.11E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 1.80E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |

Table 7-13.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 1.73E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 6.44E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.006 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 2.80E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.4 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 1.29E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.1 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.34E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.03 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.08E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.4 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 7.10E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.004 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.52E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.04 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 9.03E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 1.67E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.06 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 9.66E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.3 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 1.97E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.3 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 9.90E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.4 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 1.75E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 1.75E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 2 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 1.45E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.03 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.41E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.75E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0005 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.64E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.4 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.45E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 3.83E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.02 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 8.05E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.08 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.59E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.02 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.36E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.07 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 9.43E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.41E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.2 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 5.70E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.01 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 2.71E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 8.08E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0002 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 8.82E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 3.19E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 1.57E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.63E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.003 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.31E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 8.61E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0006 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 9.11E-07 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.07 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 4.06E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.05 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 4.68E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 2.39E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.003 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.20E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.1 |

Table 7-13.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | Value | Units | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 2.12E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 2.12E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 1.76E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.01 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.02E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 7 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 7 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 38 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 42 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-14.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.09E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.006 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.78E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.81E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00003 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.05E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00005 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.84E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.26E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.27E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.41E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.40E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.67E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.78E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 9.28E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.01 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 5.96E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.006 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.90E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.07 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.10E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.25E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.007 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.91E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.006 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.36E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 8.33E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.03 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.04E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.03 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.03E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.008 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.82E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.002 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.81E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.009 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.39E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.001 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 3.10E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.65E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.002 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.91E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.2 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.07E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.87E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0004 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.81E-10 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.70E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000002 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 6.31E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000003 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.13E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.90E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.16E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 6.29E-07 | mg/kg-day | -- | -- | -- |

Table 7-14.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.65E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.36E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.59E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 5.60E-13 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.0008 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.20E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.83E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.01 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.11E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0006 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.84E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.005 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.74E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.67E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0005 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.11E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0006 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 4.07E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.004 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.68E-09 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0005 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.63E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.005 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.49E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0007 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 6.24E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00006 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.54E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.001 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.39E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.04 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 2.06E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00001 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 6.32E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000002 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.18E-07 | µg/m³ | 3.00E+01 | µg/m³ | 4E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.74E-07 | µg/m³ | 1.00E+03 | µg/m³ | 6E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.14E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000007 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.40E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.61E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.69E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.0008 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.92E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 2.85E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.41E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 7.72E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 1.90E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.22E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 5.93E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.00002 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.16E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00005 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.48E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0001 |

Table 7-14.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.90E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0005 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.82E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00008 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.70E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.17E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 4.14E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.0008 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 5.77E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000002 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.69E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0004 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.51E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 6.34E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.56E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00002 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.41E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.36E-01 | µg/m³ | 2.00E-01 | µg/m³ | 1 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.67E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.01 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.74E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.0009 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 7.86E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00008 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.48E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.001 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.67E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.88E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 5.18E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | | | | | -- | | | | | 1 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.60E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.006 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 6.91E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 2 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.73E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 1.94E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.1 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 8.56E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.09 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 8.49E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.008 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.33E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.07 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.01E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 2.61E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.3 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 2.19E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.04 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 2.84E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 3.29E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00007 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 4.00E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.1 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 3.76E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 3.21E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |

Table 7-14.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 3.09E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.15E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 5.00E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.7 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 2.31E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.2 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.40E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.06 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.93E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.6 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 1.27E-03 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.006 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.34E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.07 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.61E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.03 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 2.99E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.1 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 1.72E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.6 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 3.52E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.5 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.77E-02 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.7 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 3.12E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.02 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 3.12E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 3 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 2.59E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.05 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 2.51E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 10 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.45E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0002 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 8.62E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.29E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 2.02E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 4.23E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.04 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 8.36E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.008 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 7.18E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.04 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 4.96E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.008 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 7.43E-03 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.09 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 3.00E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.006 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 1.43E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.07 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 4.25E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00008 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 4.64E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.1 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.68E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 7.48E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0007 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 7.77E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.001 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 6.27E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 4.11E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0003 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-07 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.03 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 5.23E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 1.94E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.03 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 2.24E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 1.14E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 5.73E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.06 |

Table 7-14.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 1.01E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0009 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 1.01E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 8.41E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.006 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 4.89E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.8 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 10 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 10 |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | (2) | -- | -- | -- | -- | 6.46E-04 | µg/m³ | 7.00E+00 | µg/m³ | 0.00009 |
| | | | | Benzene | 2.75E+01 | µg/m³ | (2) | -- | -- | -- | -- | 1.51E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.005 |
| | | | | Chloroform | 5.77E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.18E-04 | µg/m³ | 9.77E+01 | µg/m³ | 0.000003 |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | (2) | -- | -- | -- | -- | 3.88E-03 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | (2) | -- | -- | -- | -- | 1.69E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0002 |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.61E-02 | µg/m³ | 4.00E+02 | µg/m³ | 0.00004 |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.75E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.006 |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.70E-03 | µg/m³ | 4.00E+01 | µg/m³ | 0.00004 |
| | | | | Toluene | 9.81E+01 | µg/m³ | (2) | -- | -- | -- | -- | 5.40E-01 | µg/m³ | 5.00E+03 | µg/m³ | 0.0001 |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.01E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0002 |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | (2) | -- | -- | -- | -- | 5.59E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.006 |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.53E-04 | µg/m³ | 4.00E-01 | µg/m³ | 0.0009 |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | (2) | -- | -- | -- | -- | 5.26E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.002 |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.10E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.01E-04 | µg/m³ | -- | -- | -- |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00003 |
| | | | | Mercury | 7.72E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.25E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.0001 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 42 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 43 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.
(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-15.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 1.02E-05 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.14E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 5.86E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.85E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.06E-06 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 6.94E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.23E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 4.51E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.31E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 7.60E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 9.08E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 3.83E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 9E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 9.41E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 6.05E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 2.94E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 2.13E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 7.35E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.04E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.39E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 8.45E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 2.07E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 2.05E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.86E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.83E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 7.49E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 3.15E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 7.76E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 7.01E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 4.98E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 1.53E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 4.76E-10 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-11 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.39E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 5.17E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 6E-09 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 3.38E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 2.60E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 9.53E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.77E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |

Table 7-15.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.61E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.92E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 6.22E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 4.59E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 9.82E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 4.78E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.73E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.19E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.69E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 3.88E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 1.37E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 3.37E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 3.34E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 4.65E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 2.97E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 1.22E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 5.11E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.26E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.14E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 2E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 3.82E-07 | µg/m³ | 1.60E-05 | m³/µg | 6E-12 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 1.17E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.18E-06 | µg/m³ | 2.19E-08 | µg/m³ | 7.80E-06 | m³/µg | 2E-13 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 1.07E-07 | µg/m³ | 2.50E-06 | m³/µg | 3E-13 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 3.97E-08 | µg/m³ | 3.40E-05 | m³/µg | 1E-12 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 2.60E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 4.74E-07 | µg/m³ | 6.00E-05 | m³/µg | 3E-11 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 1.74E-06 | µg/m³ | 6.00E-04 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 5.06E-07 | µg/m³ | 6.00E-05 | m³/µg | 3E-11 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 2.93E-08 | µg/m³ | 6.00E-04 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 3.50E-07 | µg/m³ | 6.00E-05 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.43E-09 | µg/m³ | 6.90E-05 | m³/µg | 1E-13 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 3.52E-13 | µg/m³ | 3.80E+01 | m³/µg | 1E-11 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 2.26E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 5.93E-05 | µg/m³ | 1.10E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 1.33E-07 | µg/m³ | 4.30E-03 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 2.75E-07 | µg/m³ | 1.80E-03 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |

Table 7-15.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 4.02E-06 | µg/m³ | 1.20E-02 | m³/µg | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 8.95E-08 | µg/m³ | 9.00E-03 | m³/µg | 8E-10 | (2) | -- | -- | -- | -- |
| | | | | Copper | 1.70E-03 | µg/m³ | 3.16E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 7.75E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 7.69E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 5.77E-07 | µg/m³ | 1.07E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 3.69E-04 | µg/m³ | 6.85E-06 | µg/m³ | 2.60E-04 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Silver | 1.51E-05 | µg/m³ | 2.80E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 1.18E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 2.90E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.41E-03 | µg/m³ | 2.62E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 5E-08 | | | | | -- |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | 4.38E-02 | µg/m³ | 1.60E-05 | m³/µg | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | 6.81E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.74E-01 | µg/m³ | 5.08E-03 | µg/m³ | 7.80E-06 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | 1.46E-02 | µg/m³ | 2.50E-06 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | 6.46E-04 | µg/m³ | 3.40E-05 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | 3.10E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | 4.00E-05 | µg/m³ | 6.00E-05 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | 9.63E-11 | µg/m³ | 3.80E+01 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 8E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 8E-07 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 9E-07 | | | | | -- |
| Medium Total | | | | | | | | | | | 2E-04 | | | | | -- |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 1.18E-05 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 2.27E-03 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 5.67E-06 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 6.37E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 2.81E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 2.79E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 4.38E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 3.31E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 8.56E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.68E-05 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 9.34E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.08E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 1.31E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 6.27E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 5.35E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |

Table 7-15.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 5.15E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 3.78E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 1.64E-10 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 7.58E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 7.88E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 6.35E-05 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 4.17E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 4.41E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 5.30E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 4.97E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 5.67E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 1.16E-01 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 5.81E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 1.02E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.02E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 8.52E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 8.25E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 3.68E-07 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 2.19E-04 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 3.27E-07 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 5.12E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 1.08E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 2.12E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 1.82E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 1.26E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 1.89E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.91E-06 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 3.62E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.08E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 1.18E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 4.27E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.95E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 2.02E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 1.63E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 1.07E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 1.13E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 1.36E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 2.77E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 6E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 5.82E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 2.97E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 1.49E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-15.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Mercury | 1.30E-04 | mg/L | 2.63E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 2.63E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 2.19E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 1.27E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | 6.46E-05 | µg/m³ | 2.60E-05 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.75E+01 | µg/m³ | 1.51E-02 | µg/m³ | 7.80E-06 | m³/µg | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 5.77E-02 | µg/m³ | 3.18E-05 | µg/m³ | 2.30E-05 | m³/µg | 7E-10 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | 3.88E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | 1.69E-02 | µg/m³ | 2.50E-06 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | 1.61E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | 1.75E-03 | µg/m³ | 3.40E-05 | m³/µg | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | 1.70E-04 | µg/m³ | 2.60E-07 | m³/µg | 4E-11 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 9.81E+01 | µg/m³ | 5.40E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | 2.73E-02 | µg/m³ | 4.10E-06 | m³/µg | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | 5.59E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | 3.53E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | 5.26E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | 5.55E-04 | µg/m³ | 6.00E-05 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | 1.01E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | 1.24E-10 | µg/m³ | 3.80E+01 | m³/µg | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | 4.25E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 4E-07 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 1.51E-01 | µg/m³ | 2.60E-05 | m³/µg | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 4.76E+02 | µg/m³ | 8.48E+01 | µg/m³ | 7.80E-06 | m³/µg | 7E-04 | (2) | -- | -- | -- | -- |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 5.34E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 7.46E+01 | µg/m³ | 2.50E-06 | m³/µg | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 7.62E+00 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 3.85E-01 | µg/m³ | 3.40E-05 | m³/µg | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 1.80E+00 | µg/m³ | 2.60E-07 | m³/µg | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 2.66E+03 | µg/m³ | 4.74E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 5.44E-01 | µg/m³ | 4.10E-06 | m³/µg | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 2.32E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 1.23E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 1.89E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-15.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | Exp. Route Total | | | | | | | | 9E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 9E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | | | | | 2E-03 | | | | | -- |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 2E-03 | | | | Total of Receptor Hazards Across All Media | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-16.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 4.72E-04 | mg/kg-day | -- | -- | -- | 4.93E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.005 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 6.13E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 9E-08 | 6.41E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 4.37E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-07 | 4.57E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.002 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.40E-07 | mg/kg-day | -- | -- | -- | 1.46E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Iron | 8.70E+03 | mg/kg | 3.56E-04 | mg/kg-day | -- | -- | -- | 3.72E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Thallium | 1.09E-01 | mg/kg | 4.47E-09 | mg/kg-day | -- | -- | -- | 4.67E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | 3E-07 | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 6.66E-06 | mg/kg-day | -- | -- | -- | 6.95E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00007 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 4.33E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-09 | 4.52E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 6.17E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-07 | 6.44E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0009 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.97E-09 | mg/kg-day | -- | -- | -- | 2.06E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00007 |
| | | | | Iron | 8.70E+03 | mg/kg | 5.03E-06 | mg/kg-day | -- | -- | -- | 5.25E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00008 |
| | | | | Thallium | 1.09E-01 | mg/kg | 6.30E-11 | mg/kg-day | -- | -- | -- | 6.58E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00007 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.001 |
| | | Exp. Point Total | | | | | | | | | 4E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 4E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 9.26E-05 | µg/m³ | -- | -- | -- | 9.67E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 2.01E-08 | µg/m³ | 4.30E-03 | m³/µg | 9E-11 | 2.10E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 8.58E-08 | µg/m³ | 1.20E-02 | m³/µg | 1E-09 | 8.96E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.0001 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 2.74E-08 | µg/m³ | 9.00E-03 | m³/µg | 2E-10 | 2.86E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00005 |
| | | | | Iron | 6.40E-03 | µg/m³ | 6.99E-05 | µg/m³ | -- | -- | -- | 7.31E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 8.76E-10 | µg/m³ | -- | -- | -- | 9.15E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-09 | | | | | 0.0004 |
| | | Exp. Point Total | | | | | | | | | 1E-09 | | | | | 0.0004 |
| | Exp. Medium Total | | | | | | | | | | 1E-09 | | | | | 0.0004 |
| Medium Total | | | | | | | | | | | 4E-07 | | | | | 0.03 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 1.90E-07 | µg/m³ | 2.60E-05 | m³/µg | 5E-12 | 1.98E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000003 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 7.19E-05 | µg/m³ | 7.80E-06 | m³/µg | 6E-10 | 7.52E-04 | µg/m³ | 3.00E+01 | µg/m³ | 0.00003 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 1.44E-07 | µg/m³ | 2.30E-05 | m³/µg | 3E-12 | 1.51E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000002 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 1.83E-06 | µg/m³ | -- | -- | -- | 1.92E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 8.04E-05 | µg/m³ | 2.50E-06 | m³/µg | 2E-10 | 8.40E-04 | µg/m³ | 1.00E+03 | µg/m³ | 0.0000008 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 8.30E-06 | µg/m³ | -- | -- | -- | 8.67E-05 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000002 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 3.43E-06 | µg/m³ | 3.40E-05 | m³/µg | 1E-10 | 3.58E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00001 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 1.40E-06 | µg/m³ | 2.60E-07 | m³/µg | 4E-13 | 1.46E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000004 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 2.55E-04 | µg/m³ | -- | -- | -- | 2.67E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.0000005 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 2.73E-07 | µg/m³ | 4.10E-06 | m³/µg | 1E-12 | 2.85E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000001 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 2.15E-04 | µg/m³ | -- | -- | -- | 2.24E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-16.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 5.18E-08 | µg/m³ | -- | -- | -- | 5.41E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000001 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 8.71E-07 | µg/m³ | -- | -- | -- | 9.10E-06 | µg/m³ | 3.00E+00 | µg/m³ | 0.000003 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 4.95E-11 | µg/m³ | 6.00E-05 | m³/µg | 3E-15 | 5.17E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 9.85E-09 | µg/m³ | -- | -- | -- | 1.03E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 1.08E-13 | µg/m³ | 3.80E+01 | m³/µg | 4E-12 | 1.13E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 1.45E-08 | µg/m³ | -- | -- | -- | 1.52E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000005 |
| | | | Exp. Route Total | | | | | | | | 9E-10 | | | | | 0.00007 |
| | | Exp. Point Total | | | | | | | | | 9E-10 | | | | | 0.00007 |
| | Exp. Medium Total | | | | | | | | | | 9E-10 | | | | | 0.00007 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 9.28E-03 | µg/m³ | 2.60E-05 | m³/µg | 2E-07 | 9.69E-02 | µg/m³ | 7.00E+00 | µg/m³ | 0.01 |
| | | | | Benzene | 4.76E+02 | µg/m³ | 5.20E+00 | µg/m³ | 7.80E-06 | m³/µg | 4E-05 | 5.43E+01 | µg/m³ | 3.00E+01 | µg/m³ | 2 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 3.28E+01 | µg/m³ | -- | -- | -- | 3.42E+02 | µg/m³ | 6.00E+03 | µg/m³ | 0.06 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 4.58E+00 | µg/m³ | 2.50E-06 | m³/µg | 1E-05 | 4.78E+01 | µg/m³ | 1.00E+03 | µg/m³ | 0.05 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 4.68E-01 | µg/m³ | -- | -- | -- | 4.89E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.01 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 2.36E-02 | µg/m³ | 3.40E-05 | m³/µg | 8E-07 | 2.47E-01 | µg/m³ | 3.00E+00 | µg/m³ | 0.08 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 1.10E-01 | µg/m³ | 2.60E-07 | m³/µg | 3E-08 | 1.15E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.03 |
| | | | | Toluene | 2.66E+03 | µg/m³ | 2.91E+01 | µg/m³ | -- | -- | -- | 3.04E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.06 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 1.58E-02 | µg/m³ | 4.10E-06 | m³/µg | 6E-08 | 1.66E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.08 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 1.42E+01 | µg/m³ | -- | -- | -- | 1.48E+02 | µg/m³ | 1.00E+02 | µg/m³ | 1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 7.57E-04 | µg/m³ | -- | -- | -- | 7.91E-03 | µg/m³ | 4.00E-01 | µg/m³ | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 1.16E-03 | µg/m³ | -- | -- | -- | 1.21E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.04 |
| | | | Exp. Route Total | | | | | | | | 5E-05 | | | | | 4 |
| | | Exp. Point Total | | | | | | | | | 5E-05 | | | | | 4 |
| | Exp. Medium Total | | | | | | | | | | 5E-05 | | | | | 4 |
| Medium Total | | | | | | | | | | | 5E-05 | | | | | 4 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-17.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 3.52E-05 | mg/kg-day | -- | -- | -- | 4.93E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.005 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 4.58E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-09 | 6.41E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.26E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-08 | 4.57E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0009 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.04E-08 | mg/kg-day | -- | -- | -- | 1.46E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0005 |
| | | | | Iron | 8.70E+03 | mg/kg | 2.66E-05 | mg/kg-day | -- | -- | -- | 3.72E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.33E-10 | mg/kg-day | -- | -- | -- | 4.67E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.24E-06 | mg/kg-day | -- | -- | -- | 1.74E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0002 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 8.07E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-09 | 1.13E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.15E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-08 | 1.61E-07 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.68E-10 | mg/kg-day | -- | -- | -- | 5.15E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00002 |
| | | | | Iron | 8.70E+03 | mg/kg | 9.38E-07 | mg/kg-day | -- | -- | -- | 1.31E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0002 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.18E-11 | mg/kg-day | -- | -- | -- | 1.65E-09 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.00004 |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | 5E-08 | | | | | 0.01 |
| | Exp. Medium Total | | | | | | | | | | 5E-08 | | | | | 0.01 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.08E+00 | µg/m³ | 8.84E-04 | µg/m³ | -- | -- | -- | 1.24E-01 | µg/m³ | 5.00E+00 | µg/m³ | 0.02 |
| | | | | Arsenic | 2.35E-04 | µg/m³ | 1.92E-07 | µg/m³ | 4.30E-03 | m³/µg | 8E-10 | 2.68E-05 | µg/m³ | 1.50E-02 | µg/m³ | 0.002 |
| | | | | Chromium, Total | 1.00E-03 | µg/m³ | 8.19E-07 | µg/m³ | 1.20E-02 | m³/µg | 1E-08 | 1.15E-04 | µg/m³ | 3.00E-01 | µg/m³ | 0.0004 |
| | | | | Cobalt | 3.21E-04 | µg/m³ | 2.62E-07 | µg/m³ | 9.00E-03 | m³/µg | 2E-09 | 3.67E-05 | µg/m³ | 2.00E-02 | µg/m³ | 0.002 |
| | | | | Iron | 8.19E-01 | µg/m³ | 6.68E-04 | µg/m³ | -- | -- | -- | 9.35E-02 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 1.03E-05 | µg/m³ | 8.37E-09 | µg/m³ | -- | -- | -- | 1.17E-06 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | 1E-08 | | | | | 0.03 |
| | Exp. Medium Total | | | | | | | | | | 1E-08 | | | | | 0.03 |
| Medium Total | | | | | | | | | | | 6E-08 | | | | | 0.04 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 4.82E-10 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 4E-11 | 6.75E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000003 |
| | | | | Benzene | 2.88E-01 | mg/L | 9.26E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 5E-09 | 1.30E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.001 |
| | | | | Chloroform | 7.20E-04 | mg/L | 2.31E-10 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 7E-12 | 3.24E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000003 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 2.60E-09 | mg/kg-day | -- | -- | -- | 3.63E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 1.15E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-09 | 1.60E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0003 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 1.14E-08 | mg/kg-day | -- | -- | -- | 1.59E-06 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.000004 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 1.78E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 2E-09 | 2.50E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000004 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 1.35E-09 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 3E-12 | 1.89E-07 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00002 |
| | | | | Toluene | 1.09E+00 | mg/L | 3.49E-07 | mg/kg-day | -- | -- | -- | 4.89E-05 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.00006 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 2.93E-10 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 1E-11 | 4.10E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00008 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 3.81E-07 | mg/kg-day | -- | -- | -- | 5.33E-05 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-17.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 4.41E-10 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 4E-12 | 6.18E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000006 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 5.35E-09 | mg/kg-day | -- | -- | -- | 7.49E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 5.04E-11 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-12 | 7.06E-09 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 4.30E-11 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-11 | 6.02E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00002 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 4.14E-11 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-12 | 5.80E-09 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 1.54E-10 | mg/kg-day | -- | -- | -- | 2.16E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 6.70E-15 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 9E-10 | 9.37E-13 | mg/kg-day | 2.00E-08 | mg/kg-day | 0.00005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 3.09E-06 | mg/kg-day | -- | -- | -- | 4.33E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0004 |
| | | | | Antimony | 1.00E-03 | mg/L | 3.21E-10 | mg/kg-day | -- | -- | -- | 4.49E-08 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.0001 |
| | | | | Arsenic | 8.07E-03 | mg/L | 2.59E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-09 | 3.63E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00007 |
| | | | | Barium | 5.29E-02 | mg/L | 1.70E-08 | mg/kg-day | -- | -- | -- | 2.38E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | Beryllium | 5.60E-03 | mg/L | 1.80E-09 | mg/kg-day | -- | -- | -- | 2.52E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00005 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 2.16E-10 | mg/kg-day | -- | -- | -- | 3.03E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00006 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 4.00E-09 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-09 | 5.60E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Cobalt | 7.19E-03 | mg/L | 2.31E-09 | mg/kg-day | -- | -- | -- | 3.23E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0001 |
| | | | | Iron | 1.47E+01 | mg/L | 4.71E-06 | mg/kg-day | -- | -- | -- | 6.59E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0009 |
| | | | | Manganese | 7.38E-01 | mg/L | 2.37E-07 | mg/kg-day | -- | -- | -- | 3.32E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.001 |
| | | | | Mercury | 1.30E-04 | mg/L | 4.17E-11 | mg/kg-day | -- | -- | -- | 5.84E-09 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 4.17E-10 | mg/kg-day | -- | -- | -- | 5.84E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.001 |
| | | | | Vanadium | 1.08E-02 | mg/L | 3.47E-09 | mg/kg-day | -- | -- | -- | 4.86E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00005 |
| | | | | Zinc | 1.05E-01 | mg/L | 3.36E-08 | mg/kg-day | -- | -- | -- | 4.71E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | 0.007 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 9.29E-10 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 8E-11 | 1.30E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000007 |
| | | | | Benzene | 2.88E-01 | mg/L | 5.81E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-08 | 8.13E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.008 |
| | | | | Chloroform | 7.20E-04 | mg/L | 7.83E-10 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-11 | 1.10E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000001 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 1.29E-08 | mg/kg-day | -- | -- | -- | 1.80E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00009 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 2.52E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-08 | 3.53E-04 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.007 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 4.78E-07 | mg/kg-day | -- | -- | -- | 6.69E-05 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.0002 |
| | | | | Naphthalene | 5.56E-02 | mg/L | 4.16E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-08 | 5.82E-05 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0001 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 2.79E-08 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 6E-11 | 3.91E-06 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.0005 |
| | | | | Toluene | 1.09E+00 | mg/L | 4.67E-06 | mg/kg-day | -- | -- | -- | 6.54E-04 | mg/kg-day | 8.00E-01 | mg/kg-day | 0.0008 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.77E-09 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 8E-11 | 2.48E-07 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0005 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 8.49E-06 | mg/kg-day | -- | -- | -- | 1.19E-03 | mg/kg-day | 4.00E-01 | mg/kg-day | 0.003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 2.47E-08 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 2E-10 | 3.46E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00003 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 2.66E-07 | mg/kg-day | -- | -- | -- | 3.73E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.009 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 9.46E-09 | mg/kg-day | -- | -- | -- | 1.32E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.04E-06 | mg/kg-day | -- | -- | -- | 1.45E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Antimony | 1.00E-03 | mg/L | 1.08E-10 | mg/kg-day | -- | -- | -- | 1.51E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.0003 |
| | | | | Arsenic | 8.07E-03 | mg/L | 8.70E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-09 | 1.22E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00002 |
| | | | | Barium | 5.29E-02 | mg/L | 5.71E-09 | mg/kg-day | -- | -- | -- | 7.99E-07 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.00006 |
| | | | | Beryllium | 5.60E-03 | mg/L | 6.04E-10 | mg/kg-day | -- | -- | -- | 8.46E-08 | mg/kg-day | 3.50E-05 | mg/kg-day | 0.002 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 7.26E-11 | mg/kg-day | -- | -- | -- | 1.02E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0004 |

Table 7-17.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 2.69E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 5E-08 | 3.76E-07 | mg/kg-day | 1.25E-04 | mg/kg-day | 0.003 |
| | | | | Cobalt | 7.19E-03 | mg/L | 3.10E-10 | mg/kg-day | -- | -- | -- | 4.34E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00001 |
| | | | | Iron | 1.47E+01 | mg/L | 1.58E-06 | mg/kg-day | -- | -- | -- | 2.21E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0003 |
| | | | | Manganese | 7.38E-01 | mg/L | 7.95E-08 | mg/kg-day | -- | -- | -- | 1.11E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.01 |
| | | | | Mercury | 1.30E-04 | mg/L | 1.40E-11 | mg/kg-day | -- | -- | -- | 1.96E-09 | mg/kg-day | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.40E-10 | mg/kg-day | -- | -- | -- | 1.96E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 1.08E-02 | mg/L | 1.17E-09 | mg/kg-day | -- | -- | -- | 1.63E-07 | mg/kg-day | 2.60E-04 | mg/kg-day | 0.0006 |
| | | | | Zinc | 1.05E-01 | mg/L | 6.78E-09 | mg/kg-day | -- | -- | -- | 9.49E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000003 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | 2E-07 | | | | | 0.06 |
| | Exp. Medium Total | | | | | | | | | | 2E-07 | | | | | 0.06 |
| | Outdoor Air | Trench (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.19E+01 | µg/m³ | 2.52E-03 | µg/m³ | 2.60E-05 | m³/µg | 7E-08 | 3.53E-01 | µg/m³ | 7.00E+01 | µg/m³ | 0.005 |
| | | | | Benzene | 2.69E+03 | µg/m³ | 5.71E-01 | µg/m³ | 7.80E-06 | m³/µg | 4E-06 | 8.00E+01 | µg/m³ | 8.00E+01 | µg/m³ | 1 |
| | | | | Chloroform | 5.42E+00 | µg/m³ | 1.15E-03 | µg/m³ | 2.30E-05 | m³/µg | 3E-08 | 1.61E-01 | µg/m³ | 2.44E+02 | µg/m³ | 0.0007 |
| | | | | cis-1,2-Dichloroethene | 6.76E+01 | µg/m³ | 1.43E-02 | µg/m³ | -- | -- | -- | 2.01E+00 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 2.87E+03 | µg/m³ | 6.09E-01 | µg/m³ | 2.50E-06 | m³/µg | 2E-06 | 8.52E+01 | µg/m³ | 9.00E+03 | µg/m³ | 0.009 |
| | | | | Isopropylbenzene | 2.70E+02 | µg/m³ | 5.72E-02 | µg/m³ | -- | -- | -- | 8.01E+00 | µg/m³ | 9.00E+01 | µg/m³ | 0.09 |
| | | | | Naphthalene | 3.67E+02 | µg/m³ | 7.78E-02 | µg/m³ | 3.40E-05 | m³/µg | 3E-06 | 1.09E+01 | µg/m³ | 3.00E+00 | µg/m³ | 4 |
| | | | | Tetrachloroethene | 2.72E+01 | µg/m³ | 5.76E-03 | µg/m³ | 2.60E-07 | m³/µg | 1E-09 | 8.06E-01 | µg/m³ | 4.07E+01 | µg/m³ | 0.02 |
| | | | | Toluene | 9.37E+03 | µg/m³ | 1.99E+00 | µg/m³ | -- | -- | -- | 2.78E+02 | µg/m³ | 5.00E+03 | µg/m³ | 0.06 |
| | | | | Trichloroethene | 6.62E+00 | µg/m³ | 1.40E-03 | µg/m³ | 4.10E-06 | m³/µg | 6E-09 | 1.96E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.1 |
| | | | | Xylenes, Total | 9.51E+03 | µg/m³ | 2.02E+00 | µg/m³ | -- | -- | -- | 2.82E+02 | µg/m³ | 4.00E+02 | µg/m³ | 0.7 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 7.81E+00 | µg/m³ | 1.66E-03 | µg/m³ | -- | -- | -- | 2.32E-01 | µg/m³ | 4.00E+00 | µg/m³ | 0.06 |
| | | | | 2-Methylnaphthalene | 1.05E+02 | µg/m³ | 2.24E-02 | µg/m³ | -- | -- | -- | 3.13E+00 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.31E-02 | µg/m³ | 1.12E-05 | µg/m³ | 6.00E-05 | m³/µg | 7E-10 | 1.57E-03 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 5.84E-01 | µg/m³ | 1.24E-04 | µg/m³ | -- | -- | -- | 1.73E-02 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 6.01E-05 | µg/m³ | 1.28E-08 | µg/m³ | 3.80E+01 | m³/µg | 5E-07 | 1.79E-06 | µg/m³ | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.63E-01 | µg/m³ | 1.62E-04 | µg/m³ | -- | -- | -- | 2.26E-02 | µg/m³ | 3.00E-01 | µg/m³ | 0.08 |
| | | | Exp. Route Total | | | | | | | | 9E-06 | | | | | 6 |
| | | Exp. Point Total | | | | | | | | | 9E-06 | | | | | 6 |
| | Exp. Medium Total | | | | | | | | | | 9E-06 | | | | | 6 |
| Medium Total | | | | | | | | | | | 9E-06 | | | | | 6 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 9E-06 | | | | Total of Receptor Hazards Across All Media | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-18.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.42E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.04 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.74E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.09E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.01 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.31E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.04 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.34E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.05 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.18E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.04 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.2 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 6.99E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0007 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.54E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.47E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.009 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.07E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 5.28E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0008 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.61E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0007 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.2 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.2 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 8.46E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.83E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.84E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.0001 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.51E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00004 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.39E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 8.01E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.2 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.02E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 3.87E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 1 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 9.67E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.001 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 1.09E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.05 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 4.79E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.05 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 4.75E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.005 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 7.46E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.04 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.64E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.009 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.46E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.2 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 1.23E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.02 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 1.59E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.08 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-18.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 1.84E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00004 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 2.24E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.06 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 2.11E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 1.80E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 1.73E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 6.44E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.006 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 2.80E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.4 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 1.29E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.1 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.34E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.03 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.08E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.4 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 7.10E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.004 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.52E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.04 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 9.03E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 1.67E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.06 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 9.66E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.3 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 1.97E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.3 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 9.90E-03 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.4 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 1.75E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 1.75E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 2 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 1.45E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.03 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.41E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.75E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0005 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 1.64E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.4 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.45E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 3.83E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.02 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 8.05E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.08 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 1.59E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.02 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.36E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.07 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 9.43E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 1.41E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.2 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 5.70E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.01 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 2.71E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 8.08E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.0002 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 8.82E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 3.19E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 1.57E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.002 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.63E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.003 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.31E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 8.61E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0006 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 9.11E-07 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.07 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.004 |

Table 7-18.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 4.06E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.05 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 4.68E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 2.39E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.003 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.20E-04 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.1 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 2.12E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 2.12E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 1.76E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.01 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 1.02E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 7 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 7 |
| | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| Medium Total | | | | | | | | | | | -- | | | | | 38 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 38 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-19.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.14E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.004 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.38E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.84E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.23E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.13E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.92E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.33E-05 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.00008 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.41E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.71E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.47E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00008 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.29E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00009 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 7.88E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 8.46E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.0002 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.83E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.84E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.0001 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.51E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00004 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 6.39E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 8.01E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.02 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.60E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.006 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 6.91E-03 | mg/kg-day | 4.00E-03 | mg/kg-day | 2 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.73E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.002 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 1.94E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.1 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 8.56E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.09 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 8.49E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.008 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 1.33E-03 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.07 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.01E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.02 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 2.61E-02 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.3 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 2.19E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.04 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 2.84E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.1 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-19.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 3.29E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00007 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 4.00E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.1 |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | (2) | -- | -- | -- | -- | 3.76E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | (2) | -- | -- | -- | -- | 3.21E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | (2) | -- | -- | -- | -- | 3.09E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.15E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | (2) | -- | -- | -- | -- | 5.00E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.7 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 2.31E-01 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.2 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.40E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.06 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 1.93E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.6 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 1.27E-03 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.006 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.34E-04 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.07 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 1.61E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.03 |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 2.99E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.1 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 1.72E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.6 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 3.52E-01 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.5 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 1.77E-02 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.7 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 3.12E-06 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.02 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 3.12E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 3 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 2.59E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.05 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 2.51E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 10 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.45E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0002 |
| | | | | Benzene | 2.88E-01 | mg/L | (2) | -- | -- | -- | -- | 8.62E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.2 |
| | | | | Chloroform | 7.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.29E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | (2) | -- | -- | -- | -- | 2.02E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | (2) | -- | -- | -- | -- | 4.23E-03 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.04 |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | (2) | -- | -- | -- | -- | 8.36E-04 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.008 |
| | | | | Naphthalene | 5.56E-02 | mg/L | (2) | -- | -- | -- | -- | 7.18E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.04 |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | (2) | -- | -- | -- | -- | 4.96E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.008 |
| | | | | Toluene | 1.09E+00 | mg/L | (2) | -- | -- | -- | -- | 7.43E-03 | mg/kg-day | 8.00E-02 | mg/kg-day | 0.09 |
| | | | | Trichloroethene | 9.13E-04 | mg/L | (2) | -- | -- | -- | -- | 3.00E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.006 |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | (2) | -- | -- | -- | -- | 1.43E-02 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.07 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | (2) | -- | -- | -- | -- | 4.25E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00008 |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | (2) | -- | -- | -- | -- | 4.64E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.1 |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.68E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | (2) | -- | -- | -- | -- | 7.48E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0007 |
| | | | | Antimony | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 7.77E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.001 |
| | | | | Arsenic | 8.07E-03 | mg/L | (2) | -- | -- | -- | -- | 6.27E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Barium | 5.29E-02 | mg/L | (2) | -- | -- | -- | -- | 4.11E-06 | mg/kg-day | 1.40E-02 | mg/kg-day | 0.0003 |
| | | | | Beryllium | 5.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-07 | mg/kg-day | 1.40E-05 | mg/kg-day | 0.03 |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | (2) | -- | -- | -- | -- | 5.23E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.002 |

Table 7-19.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 1.94E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.03 |
| | | | | Cobalt | 7.19E-03 | mg/L | (2) | -- | -- | -- | -- | 2.24E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Iron | 1.47E+01 | mg/L | (2) | -- | -- | -- | -- | 1.14E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.002 |
| | | | | Manganese | 7.38E-01 | mg/L | (2) | -- | -- | -- | -- | 5.73E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.06 |
| | | | | Mercury | 1.30E-04 | mg/L | (2) | -- | -- | -- | -- | 1.01E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0009 |
| | | | | Thallium | 1.30E-03 | mg/L | (2) | -- | -- | -- | -- | 1.01E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | | Vanadium | 1.08E-02 | mg/L | (2) | -- | -- | -- | -- | 8.41E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.006 |
| | | | | Zinc | 1.05E-01 | mg/L | (2) | -- | -- | -- | -- | 4.89E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.8 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 10 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 10 |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | (2) | -- | -- | -- | -- | 6.46E-04 | µg/m³ | 7.00E+00 | µg/m³ | 0.00009 |
| | | | | Benzene | 2.75E+01 | µg/m³ | (2) | -- | -- | -- | -- | 1.51E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.005 |
| | | | | Chloroform | 5.77E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.18E-04 | µg/m³ | 9.77E+01 | µg/m³ | 0.000003 |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | (2) | -- | -- | -- | -- | 3.88E-03 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | (2) | -- | -- | -- | -- | 1.69E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0002 |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.61E-02 | µg/m³ | 4.00E+02 | µg/m³ | 0.00004 |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.75E-02 | µg/m³ | 3.00E+00 | µg/m³ | 0.006 |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.70E-03 | µg/m³ | 4.00E+01 | µg/m³ | 0.00004 |
| | | | | Toluene | 9.81E+01 | µg/m³ | (2) | -- | -- | -- | -- | 5.40E-01 | µg/m³ | 5.00E+03 | µg/m³ | 0.0001 |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.01E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0002 |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | (2) | -- | -- | -- | -- | 5.59E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.006 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.53E-04 | µg/m³ | 4.00E-01 | µg/m³ | 0.0009 |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | (2) | -- | -- | -- | -- | 5.26E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.002 |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.10E-06 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.01E-04 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.25E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.0001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 8.14E-01 | µg/m³ | 7.00E+00 | µg/m³ | 0.1 |
| | | | | Benzene | 4.76E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.56E+02 | µg/m³ | 3.00E+01 | µg/m³ | 15 |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.88E+03 | µg/m³ | 6.00E+03 | µg/m³ | 0.5 |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | (2) | -- | -- | -- | -- | 4.02E+02 | µg/m³ | 1.00E+03 | µg/m³ | 0.4 |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | (2) | -- | -- | -- | -- | 4.10E+01 | µg/m³ | 4.00E+02 | µg/m³ | 0.1 |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | (2) | -- | -- | -- | -- | 2.07E+00 | µg/m³ | 3.00E+00 | µg/m³ | 0.7 |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | (2) | -- | -- | -- | -- | 9.68E+00 | µg/m³ | 4.00E+01 | µg/m³ | 0.2 |
| | | | | Toluene | 2.66E+03 | µg/m³ | (2) | -- | -- | -- | -- | 2.55E+03 | µg/m³ | 5.00E+03 | µg/m³ | 0.5 |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | (2) | -- | -- | -- | -- | 1.39E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.7 |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | (2) | -- | -- | -- | -- | 1.25E+03 | µg/m³ | 1.00E+02 | µg/m³ | 12 |

Table 7-19.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 6.65E-02 | µg/m³ | 4.00E-01 | µg/m³ | 0.2 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.02E-01 | µg/m³ | 3.00E-01 | µg/m³ | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 31 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 31 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | | | | | -- | | | | | 42 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 42 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-20.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 4.20E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 5.46E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 2.09E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.24E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 3.17E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.98E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 6.82E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 4.43E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.40E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 7E-06 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.02E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 5.15E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 6.46E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 7E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 2E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.57E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 3.40E-08 | µg/m³ | 4.30E-03 | m³/µg | 1E-10 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 8.06E-07 | µg/m³ | 1.20E-02 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 4.65E-08 | µg/m³ | 9.00E-03 | m³/µg | 4E-10 | (2) | -- | -- | -- | -- |
| | | | | Iron | 6.40E-03 | µg/m³ | 1.19E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.49E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-08 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-08 | | | | | -- |
| Medium Total | | | | | | | | | | | 2E-05 | | | | | -- |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 1.18E-05 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 2.27E-03 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 5.67E-06 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 6.37E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 2.81E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 2.79E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 4.38E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 3.31E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 8.56E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.68E-05 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 9.34E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-20.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.08E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 1.31E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 1.57E-04 | mg/L | 6.27E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.34E-04 | mg/L | 5.35E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 1.29E-04 | mg/L | 5.15E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 3.78E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.09E-08 | mg/L | 1.64E-10 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 7.58E-02 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 7.88E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 6.35E-05 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-04 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 4.17E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 4.41E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 5.30E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 4.97E-04 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 5.67E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 1.16E-01 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 5.81E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 1.02E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 1.02E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 8.52E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 8.25E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.50E-03 | mg/L | 3.68E-07 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.88E-01 | mg/L | 2.19E-04 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 7.20E-04 | mg/L | 3.27E-07 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 8.09E-03 | mg/L | 5.12E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.57E-01 | mg/L | 1.08E-03 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 3.54E-02 | mg/L | 2.12E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 5.56E-02 | mg/L | 1.82E-04 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 4.20E-03 | mg/L | 1.26E-05 | mg/kg-day | 2.10E-03 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 1.09E+00 | mg/L | 1.89E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 9.13E-04 | mg/L | 1.91E-06 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.19E+00 | mg/L | 3.62E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 1.37E-03 | mg/L | 1.08E-05 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 1.67E-02 | mg/L | 1.18E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 4.80E-04 | mg/L | 4.27E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 9.62E+00 | mg/L | 1.95E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 1.00E-03 | mg/L | 2.02E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 8.07E-03 | mg/L | 1.63E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Barium | 5.29E-02 | mg/L | 1.07E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Beryllium | 5.60E-03 | mg/L | 1.13E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 6.73E-04 | mg/L | 1.36E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-20.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 1.25E-02 | mg/L | 2.77E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 6E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 7.19E-03 | mg/L | 5.82E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.47E+01 | mg/L | 2.97E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 7.38E-01 | mg/L | 1.49E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 1.30E-04 | mg/L | 2.63E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.30E-03 | mg/L | 2.63E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.08E-02 | mg/L | 2.19E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.05E-01 | mg/L | 1.27E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.17E-01 | µg/m³ | 6.46E-05 | µg/m³ | 2.60E-05 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.75E+01 | µg/m³ | 1.51E-02 | µg/m³ | 7.80E-06 | m³/µg | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 5.77E-02 | µg/m³ | 3.18E-05 | µg/m³ | 2.30E-05 | m³/µg | 7E-10 | (2) | -- | -- | -- | -- |
| | | | | cis-1,2-Dichloroethene | 7.04E-01 | µg/m³ | 3.88E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 3.07E+01 | µg/m³ | 1.69E-02 | µg/m³ | 2.50E-06 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 2.93E+00 | µg/m³ | 1.61E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.17E+00 | µg/m³ | 1.75E-03 | µg/m³ | 3.40E-05 | m³/µg | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 3.08E-01 | µg/m³ | 1.70E-04 | µg/m³ | 2.60E-07 | m³/µg | 4E-11 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 9.81E+01 | µg/m³ | 5.40E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 7.28E-02 | µg/m³ | 2.73E-02 | µg/m³ | 4.10E-06 | m³/µg | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.02E+02 | µg/m³ | 5.59E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.40E-02 | µg/m³ | 3.53E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2-Methylnaphthalene | 9.55E-01 | µg/m³ | 5.26E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 5.63E-04 | µg/m³ | 5.55E-04 | µg/m³ | 6.00E-05 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenzofuran | 1.83E-02 | µg/m³ | 1.01E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.25E-07 | µg/m³ | 1.24E-10 | µg/m³ | 3.80E+01 | m³/µg | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 7.72E-03 | µg/m³ | 4.25E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 4E-07 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 8.49E-01 | µg/m³ | 1.51E-01 | µg/m³ | 2.60E-05 | m³/µg | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzene | 4.76E+02 | µg/m³ | 8.48E+01 | µg/m³ | 7.80E-06 | m³/µg | 7E-04 | (2) | -- | -- | -- | -- |
| | | | | Cyclohexane | 3.00E+03 | µg/m³ | 5.34E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 4.19E+02 | µg/m³ | 7.46E+01 | µg/m³ | 2.50E-06 | m³/µg | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | Isopropylbenzene | 4.28E+01 | µg/m³ | 7.62E+00 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.16E+00 | µg/m³ | 3.85E-01 | µg/m³ | 3.40E-05 | m³/µg | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Tetrachloroethene | 1.01E+01 | µg/m³ | 1.80E+00 | µg/m³ | 2.60E-07 | m³/µg | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Toluene | 2.66E+03 | µg/m³ | 4.74E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 1.45E+00 | µg/m³ | 5.44E-01 | µg/m³ | 4.10E-06 | m³/µg | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.30E+03 | µg/m³ | 2.32E+02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-20.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 6.93E-02 | µg/m³ | 1.23E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.06E-01 | µg/m³ | 1.89E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 9E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | | | | | 2E-03 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 2E-03 | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-21.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 9.18E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 5E-08 | 9.59E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.82E-06 | mg/kg-day | -- | -- | -- | 2.95E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.006 |
| | | | | Benzene | 1.61E+00 | mg/kg | 5.26E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 3E-09 | 5.50E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.56E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-09 | 2.68E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00003 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 9.54E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-08 | 9.97E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00005 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 6.24E-07 | mg/kg-day | -- | -- | -- | 6.52E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 2.06E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 2.15E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 7.54E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 8E-07 | 7.88E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.03 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 2.19E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 2.29E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 1.27E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-08 | 1.33E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 1.52E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | 1.59E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 3.44E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 8E-10 | 3.60E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.001 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 8.46E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-07 | 8.84E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.01 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 5.44E-04 | mg/kg-day | -- | -- | -- | 5.68E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.006 |
| | | | | Antimony | 8.07E+01 | mg/kg | 2.64E-06 | mg/kg-day | -- | -- | -- | 2.76E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.07 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 1.92E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-07 | 2.00E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 6.61E-07 | mg/kg-day | -- | -- | -- | 6.90E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.007 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.74E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 9E-07 | 1.82E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.006 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 2.15E-07 | mg/kg-day | -- | -- | -- | 2.24E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Copper | 2.32E+03 | mg/kg | 7.59E-05 | mg/kg-day | -- | -- | -- | 7.93E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.02 |
| | | | | Iron | 5.68E+04 | mg/kg | 1.86E-03 | mg/kg-day | -- | -- | -- | 1.95E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.03 |
| | | | | Manganese | 5.63E+02 | mg/kg | 1.85E-05 | mg/kg-day | -- | -- | -- | 1.93E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.008 |
| | | | | Mercury | 7.85E-01 | mg/kg | 2.57E-08 | mg/kg-day | -- | -- | -- | 2.69E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.002 |
| | | | | Nickel | 5.02E+02 | mg/kg | 1.65E-05 | mg/kg-day | -- | -- | -- | 1.72E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.009 |
| | | | | Silver | 2.05E+01 | mg/kg | 6.73E-07 | mg/kg-day | -- | -- | -- | 7.03E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.001 |
| | | | | Thallium | 8.63E-02 | mg/kg | 2.83E-09 | mg/kg-day | -- | -- | -- | 2.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 6.97E-07 | mg/kg-day | -- | -- | -- | 7.28E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.001 |
| | | | | Zinc | 1.92E+03 | mg/kg | 6.30E-05 | mg/kg-day | -- | -- | -- | 6.58E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | 0.2 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 7.77E-08 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 4E-09 | 8.12E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.39E-07 | mg/kg-day | -- | -- | -- | 2.49E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0005 |
| | | | | Benzene | 1.61E+00 | mg/kg | 7.43E-11 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 4E-12 | 7.76E-10 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0000002 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.17E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-10 | 2.27E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000002 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 8.07E-09 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-09 | 8.44E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000004 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 5.28E-08 | mg/kg-day | -- | -- | -- | 5.52E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 7.54E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-09 | 7.88E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 2.77E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-07 | 2.89E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 8.04E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 8E-09 | 8.40E-07 | mg/kg-day | -- | -- | -- |

Table 7-21.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.67E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 5E-09 | 4.87E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 5.57E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-09 | 5.82E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 9.71E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-10 | 1.01E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 7.16E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 9E-09 | 7.48E-13 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.53E-05 | mg/kg-day | -- | -- | -- | 1.60E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0002 |
| | | | | Antimony | 8.07E+01 | mg/kg | 7.46E-08 | mg/kg-day | -- | -- | -- | 7.80E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.01 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 2.70E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-08 | 2.82E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.86E-09 | mg/kg-day | -- | -- | -- | 1.95E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.0008 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 4.91E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-06 | 5.13E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.007 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 6.06E-09 | mg/kg-day | -- | -- | -- | 6.33E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Copper | 2.32E+03 | mg/kg | 2.14E-06 | mg/kg-day | -- | -- | -- | 2.24E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0007 |
| | | | | Iron | 5.68E+04 | mg/kg | 5.25E-05 | mg/kg-day | -- | -- | -- | 5.49E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0008 |
| | | | | Manganese | 5.63E+02 | mg/kg | 5.21E-07 | mg/kg-day | -- | -- | -- | 5.44E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.006 |
| | | | | Mercury | 7.85E-01 | mg/kg | 7.26E-10 | mg/kg-day | -- | -- | -- | 7.59E-09 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0007 |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.64E-07 | mg/kg-day | -- | -- | -- | 4.85E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.006 |
| | | | | Silver | 2.05E+01 | mg/kg | 1.90E-08 | mg/kg-day | -- | -- | -- | 1.98E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.001 |
| | | | | Thallium | 8.63E-02 | mg/kg | 7.98E-11 | mg/kg-day | -- | -- | -- | 8.34E-10 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.00008 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.97E-08 | mg/kg-day | -- | -- | -- | 2.06E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.002 |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.78E-06 | mg/kg-day | -- | -- | -- | 1.86E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00006 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.05 |
| | | Exp. Point Total | | | | | | | | | 4E-06 | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | 4E-06 | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 3.60E-07 | µg/m³ | 1.60E-05 | m³/µg | 6E-12 | 3.76E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00002 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 1.11E-06 | µg/m³ | -- | -- | -- | 1.16E-05 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000004 |
| | | | | Benzene | 1.18E-06 | µg/m³ | 2.07E-08 | µg/m³ | 7.80E-06 | m³/µg | 2E-13 | 2.16E-07 | µg/m³ | 3.00E+01 | µg/m³ | 7E-09 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 1.01E-07 | µg/m³ | 2.50E-06 | m³/µg | 3E-13 | 1.05E-06 | µg/m³ | 1.00E+03 | µg/m³ | 1E-09 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 3.74E-08 | µg/m³ | 3.40E-05 | m³/µg | 1E-12 | 3.91E-07 | µg/m³ | 3.00E+00 | µg/m³ | 0.0000001 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 2.45E-07 | µg/m³ | -- | -- | -- | 2.56E-06 | µg/m³ | 1.00E+02 | µg/m³ | 0.00000003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 8.07E-08 | µg/m³ | 6.00E-05 | m³/µg | 5E-12 | 8.43E-07 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 2.96E-07 | µg/m³ | 6.00E-04 | m³/µg | 2E-10 | 3.09E-06 | µg/m³ | 2.00E-03 | µg/m³ | 0.002 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 8.60E-08 | µg/m³ | 6.00E-05 | m³/µg | 5E-12 | 8.99E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 4.99E-09 | µg/m³ | 6.00E-04 | m³/µg | 3E-12 | 5.21E-08 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 5.96E-08 | µg/m³ | 6.00E-05 | m³/µg | 4E-12 | 6.23E-07 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.35E-09 | µg/m³ | 6.90E-05 | m³/µg | 9E-14 | 1.41E-08 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 3.32E-13 | µg/m³ | 3.80E+01 | m³/µg | 1E-11 | 3.47E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000009 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 2.13E-04 | µg/m³ | -- | -- | -- | 2.23E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0004 |
| | | | | Antimony | 5.93E-05 | µg/m³ | 1.04E-06 | µg/m³ | -- | -- | -- | 1.08E-05 | µg/m³ | 3.00E-01 | µg/m³ | 0.00004 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 1.25E-07 | µg/m³ | 4.30E-03 | m³/µg | 5E-10 | 1.31E-06 | µg/m³ | 1.50E-02 | µg/m³ | 0.00009 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 2.59E-07 | µg/m³ | 1.80E-03 | m³/µg | 5E-10 | 2.71E-06 | µg/m³ | 1.00E-02 | µg/m³ | 0.0003 |

Table 7-21.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 6.83E-07 | µg/m³ | 1.20E-02 | m³/µg | 8E-09 | 7.14E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0009 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 8.43E-08 | µg/m³ | 9.00E-03 | m³/µg | 8E-10 | 8.81E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.0001 |
| | | | | Copper | 1.70E-03 | µg/m³ | 2.98E-05 | µg/m³ | -- | -- | -- | 3.11E-04 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 7.31E-04 | µg/m³ | -- | -- | -- | 7.63E-03 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 7.24E-06 | µg/m³ | -- | -- | -- | 7.57E-05 | µg/m³ | 5.00E-02 | µg/m³ | 0.002 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 1.01E-08 | µg/m³ | -- | -- | -- | 1.05E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 6.46E-06 | µg/m³ | 2.60E-04 | m³/µg | 2E-09 | 6.75E-05 | µg/m³ | 9.00E-02 | µg/m³ | 0.0007 |
| | | | | Silver | 1.51E-05 | µg/m³ | 2.64E-07 | µg/m³ | -- | -- | -- | 2.76E-06 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 1.11E-09 | µg/m³ | -- | -- | -- | 1.16E-08 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 2.74E-07 | µg/m³ | -- | -- | -- | 2.86E-06 | µg/m³ | 1.00E-01 | µg/m³ | 0.00003 |
| | | | | Zinc | 1.41E-03 | µg/m³ | 2.47E-05 | µg/m³ | -- | -- | -- | 2.58E-04 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | 0.006 |
| | | Exp. Point Total | | | | | | | | | 1E-08 | | | | | 0.006 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.41E+00 | µg/m³ | 4.21E-02 | µg/m³ | 1.60E-05 | m³/µg | 7E-07 | 4.39E-01 | µg/m³ | 2.00E-01 | µg/m³ | 2 |
| | | | | 2-Hexanone | 3.75E+00 | µg/m³ | 6.55E-02 | µg/m³ | -- | -- | -- | 6.84E-01 | µg/m³ | 3.00E+01 | µg/m³ | 0.02 |
| | | | | Benzene | 2.80E-01 | µg/m³ | 4.89E-03 | µg/m³ | 7.80E-06 | m³/µg | 4E-08 | 5.11E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.002 |
| | | | | Ethylbenzene | 8.03E-01 | µg/m³ | 1.40E-02 | µg/m³ | 2.50E-06 | m³/µg | 4E-08 | 1.47E-01 | µg/m³ | 1.00E+03 | µg/m³ | 0.0001 |
| | | | | Naphthalene | 3.55E-02 | µg/m³ | 6.21E-04 | µg/m³ | 3.40E-05 | m³/µg | 2E-08 | 6.49E-03 | µg/m³ | 3.00E+00 | µg/m³ | 0.002 |
| | | | | Xylenes, Total | 1.70E+00 | µg/m³ | 2.98E-02 | µg/m³ | -- | -- | -- | 3.11E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.97E-04 | µg/m³ | 6.93E-06 | µg/m³ | 6.00E-05 | m³/µg | 4E-10 | 7.24E-05 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.29E-09 | µg/m³ | 9.25E-11 | µg/m³ | 3.80E+01 | m³/µg | 4E-09 | 9.67E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 8E-07 | | | | | 2 |
| | | Exp. Point Total | | | | | | | | | 8E-07 | | | | | 2 |
| | Exp. Medium Total | | | | | | | | | | 8E-07 | | | | | 2 |
| Medium Total | | | | | | | | | | | 4E-06 | | | | | 3 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 3.03E-07 | µg/m³ | 2.60E-05 | m³/µg | 8E-12 | 3.17E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 1.15E-04 | µg/m³ | 7.80E-06 | m³/µg | 9E-10 | 1.20E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00004 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 2.31E-07 | µg/m³ | 2.30E-05 | m³/µg | 5E-12 | 2.41E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000002 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 2.93E-06 | µg/m³ | -- | -- | -- | 3.07E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 1.29E-04 | µg/m³ | 2.50E-06 | m³/µg | 3E-10 | 1.34E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000001 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 1.33E-05 | µg/m³ | -- | -- | -- | 1.39E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000003 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 5.49E-06 | µg/m³ | 3.40E-05 | m³/µg | 2E-10 | 5.73E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 2.24E-06 | µg/m³ | 2.60E-07 | m³/µg | 6E-13 | 2.34E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000006 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 4.08E-04 | µg/m³ | -- | -- | -- | 4.27E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.0000009 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 4.37E-07 | µg/m³ | 4.10E-06 | m³/µg | 2E-12 | 4.56E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000002 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 3.44E-04 | µg/m³ | -- | -- | -- | 3.59E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 8.29E-08 | µg/m³ | -- | -- | -- | 8.66E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 1.39E-06 | µg/m³ | -- | -- | -- | 1.46E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 7.92E-11 | µg/m³ | 6.00E-05 | m³/µg | 5E-15 | 8.28E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 1.58E-08 | µg/m³ | -- | -- | -- | 1.65E-07 | µg/m³ | -- | -- | -- |

Table 7-21.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 1.73E-13 | µg/m³ | 3.80E+01 | m³/µg | 7E-12 | 1.80E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 2.32E-08 | µg/m³ | -- | -- | -- | 2.42E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000008 |
| | | | Exp. Route Total | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 4E-06 | | | | | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-22.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 3.59E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-08 | 2.51E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0006 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 1.10E-06 | mg/kg-day | -- | -- | -- | 7.71E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Benzene | 1.61E+00 | mg/kg | 2.06E-08 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 1E-09 | 1.44E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00004 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.00E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-09 | 7.01E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000007 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 3.73E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 4E-09 | 2.61E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 2.44E-07 | mg/kg-day | -- | -- | -- | 1.71E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000009 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 1.21E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-08 | 5.62E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 4.42E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-07 | 2.06E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.007 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 1.29E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-08 | 6.00E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 7.45E-09 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 7E-09 | 3.48E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 8.91E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-09 | 4.16E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.34E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-10 | 9.41E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 3.30E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 4E-08 | 2.31E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 2.12E-04 | mg/kg-day | -- | -- | -- | 1.49E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Antimony | 8.07E+01 | mg/kg | 1.03E-06 | mg/kg-day | -- | -- | -- | 7.23E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.02 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 7.48E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-07 | 5.24E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.58E-07 | mg/kg-day | -- | -- | -- | 1.81E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 1.02E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 5E-07 | 4.76E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.002 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 8.40E-08 | mg/kg-day | -- | -- | -- | 5.88E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Copper | 2.32E+03 | mg/kg | 2.97E-05 | mg/kg-day | -- | -- | -- | 2.08E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.006 |
| | | | | Iron | 5.68E+04 | mg/kg | 7.28E-04 | mg/kg-day | -- | -- | -- | 5.09E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.007 |
| | | | | Manganese | 5.63E+02 | mg/kg | 7.22E-06 | mg/kg-day | -- | -- | -- | 5.05E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.002 |
| | | | | Mercury | 7.85E-01 | mg/kg | 1.01E-08 | mg/kg-day | -- | -- | -- | 7.04E-08 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.0004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 6.43E-06 | mg/kg-day | -- | -- | -- | 4.50E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Silver | 2.05E+01 | mg/kg | 2.63E-07 | mg/kg-day | -- | -- | -- | 1.84E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0004 |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.11E-09 | mg/kg-day | -- | -- | -- | 7.74E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0008 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.72E-07 | mg/kg-day | -- | -- | -- | 1.91E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.0004 |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.46E-05 | mg/kg-day | -- | -- | -- | 1.72E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | 0.06 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 6.72E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 4E-08 | 4.71E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 2.06E-06 | mg/kg-day | -- | -- | -- | 1.45E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Benzene | 1.61E+00 | mg/kg | 6.43E-10 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 4E-11 | 4.50E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 1.88E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 2E-09 | 1.31E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 6.99E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 8E-09 | 4.89E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 4.57E-07 | mg/kg-day | -- | -- | -- | 3.20E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 6.53E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 7E-10 | 4.57E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 2.39E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-08 | 1.68E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.06 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 6.96E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 7E-10 | 4.87E-06 | mg/kg-day | -- | -- | -- |

Table 7-22.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.04E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-10 | 2.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 4.82E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-10 | 3.38E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.40E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-09 | 5.88E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 6.19E-13 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 8E-08 | 4.34E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.006 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.33E-04 | mg/kg-day | -- | -- | -- | 9.29E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0009 |
| | | | | Antimony | 8.07E+01 | mg/kg | 6.46E-07 | mg/kg-day | -- | -- | -- | 4.52E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.08 |
| | | | | Arsenic | 9.74E+00 | mg/kg | 2.34E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | 1.64E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.61E-08 | mg/kg-day | -- | -- | -- | 1.13E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 4.25E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 9E-08 | 2.98E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.04 |
| | | | | Cobalt | 6.56E+00 | mg/kg | 5.25E-08 | mg/kg-day | -- | -- | -- | 3.67E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Copper | 2.32E+03 | mg/kg | 1.85E-05 | mg/kg-day | -- | -- | -- | 1.30E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.004 |
| | | | | Iron | 5.68E+04 | mg/kg | 4.55E-04 | mg/kg-day | -- | -- | -- | 3.18E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.005 |
| | | | | Manganese | 5.63E+02 | mg/kg | 4.51E-06 | mg/kg-day | -- | -- | -- | 3.16E-05 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.03 |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.28E-09 | mg/kg-day | -- | -- | -- | 4.40E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | 4.02E-06 | mg/kg-day | -- | -- | -- | 2.81E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.04 |
| | | | | Silver | 2.05E+01 | mg/kg | 1.64E-07 | mg/kg-day | -- | -- | -- | 1.15E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.006 |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.91E-10 | mg/kg-day | -- | -- | -- | 4.83E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0005 |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.70E-07 | mg/kg-day | -- | -- | -- | 1.19E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.009 |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.54E-05 | mg/kg-day | -- | -- | -- | 1.08E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | 6E-07 | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | 2E-06 | | | | | 0.4 |
| | Exp. Medium Total | | | | | | | | | | 2E-06 | | | | | 0.4 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 2.02E-08 | µg/m³ | 1.60E-05 | m³/µg | 3E-13 | 1.41E-07 | µg/m³ | 2.00E-01 | µg/m³ | 0.0000007 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 6.19E-08 | µg/m³ | -- | -- | -- | 4.33E-07 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000001 |
| | | | | Benzene | 1.18E-06 | µg/m³ | 1.16E-09 | µg/m³ | 7.80E-06 | m³/µg | 9E-15 | 8.09E-09 | µg/m³ | 3.00E+01 | µg/m³ | 3E-10 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 5.63E-09 | µg/m³ | 2.50E-06 | m³/µg | 1E-14 | 3.94E-08 | µg/m³ | 1.00E+03 | µg/m³ | 4E-11 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 2.09E-09 | µg/m³ | 3.40E-05 | m³/µg | 7E-14 | 1.47E-08 | µg/m³ | 3.00E+00 | µg/m³ | 5E-09 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 1.37E-08 | µg/m³ | -- | -- | -- | 9.59E-08 | µg/m³ | 1.00E+02 | µg/m³ | 1E-09 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 1.35E-08 | µg/m³ | 6.00E-05 | m³/µg | 8E-13 | 3.16E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 4.97E-08 | µg/m³ | 6.00E-04 | m³/µg | 3E-11 | 1.16E-07 | µg/m³ | 2.00E-03 | µg/m³ | 0.00006 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 1.44E-08 | µg/m³ | 6.00E-05 | m³/µg | 9E-13 | 3.37E-08 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 8.38E-10 | µg/m³ | 6.00E-04 | m³/µg | 5E-13 | 1.96E-09 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 1.00E-08 | µg/m³ | 6.00E-05 | m³/µg | 6E-13 | 2.34E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 7.56E-11 | µg/m³ | 6.90E-05 | m³/µg | 5E-15 | 5.29E-10 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 1.86E-14 | µg/m³ | 3.80E+01 | m³/µg | 7E-13 | 1.30E-13 | µg/m³ | 4.00E-05 | µg/m³ | 3E-09 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 1.19E-05 | µg/m³ | -- | -- | -- | 8.36E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.00002 |
| | | | | Antimony | 5.93E-05 | µg/m³ | 5.81E-08 | µg/m³ | -- | -- | -- | 4.06E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.000001 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 7.01E-09 | µg/m³ | 4.30E-03 | m³/µg | 3E-11 | 4.91E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000003 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 1.45E-08 | µg/m³ | 1.80E-03 | m³/µg | 3E-11 | 1.02E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00001 |

Table 7-22.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 1.15E-07 | µg/m³ | 1.20E-02 | m³/µg | 1E-09 | 2.68E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00003 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 4.72E-09 | µg/m³ | 9.00E-03 | m³/µg | 4E-11 | 3.30E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000006 |
| | | | | Copper | 1.70E-03 | µg/m³ | 1.67E-06 | µg/m³ | -- | -- | -- | 1.17E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 4.09E-05 | µg/m³ | -- | -- | -- | 2.86E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 4.05E-07 | µg/m³ | -- | -- | -- | 2.84E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.00006 |
| | | | | Mercury | 5.77E-07 | µg/m³ | 5.65E-10 | µg/m³ | -- | -- | -- | 3.96E-09 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000001 |
| | | | | Nickel | 3.69E-04 | µg/m³ | 3.61E-07 | µg/m³ | 2.60E-04 | m³/µg | 9E-11 | 2.53E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00003 |
| | | | | Silver | 1.51E-05 | µg/m³ | 1.48E-08 | µg/m³ | -- | -- | -- | 1.03E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 6.21E-11 | µg/m³ | -- | -- | -- | 4.35E-10 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 1.53E-08 | µg/m³ | -- | -- | -- | 1.07E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000001 |
| | | | | Zinc | 1.41E-03 | µg/m³ | 1.38E-06 | µg/m³ | -- | -- | -- | 9.68E-06 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-09 | | | | | 0.0002 |
| | | Exp. Point Total | | | | | | | | | 2E-09 | | | | | 0.0002 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 3.80E+00 | µg/m³ | 3.72E-03 | µg/m³ | 1.60E-05 | m³/µg | 6E-08 | 2.61E-02 | µg/m³ | 2.00E-01 | µg/m³ | 0.1 |
| | | | | 2-Hexanone | 5.92E+00 | µg/m³ | 5.79E-03 | µg/m³ | -- | -- | -- | 4.06E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.001 |
| | | | | Benzene | 4.42E-01 | µg/m³ | 4.32E-04 | µg/m³ | 7.80E-06 | m³/µg | 3E-09 | 3.03E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.0001 |
| | | | | Ethylbenzene | 1.27E+00 | µg/m³ | 1.24E-03 | µg/m³ | 2.50E-06 | m³/µg | 3E-09 | 8.70E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000009 |
| | | | | Naphthalene | 5.61E-02 | µg/m³ | 5.49E-05 | µg/m³ | 3.40E-05 | m³/µg | 2E-09 | 3.85E-04 | µg/m³ | 3.00E+00 | µg/m³ | 0.0001 |
| | | | | Xylenes, Total | 2.69E+00 | µg/m³ | 2.63E-03 | µg/m³ | -- | -- | -- | 1.84E-02 | µg/m³ | 1.00E+02 | µg/m³ | 0.0002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E-04 | µg/m³ | 1.84E-06 | µg/m³ | 6.00E-05 | m³/µg | 1E-10 | 4.29E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 8.37E-09 | µg/m³ | 8.19E-12 | µg/m³ | 3.80E+01 | m³/µg | 3E-10 | 5.73E-11 | µg/m³ | 4.00E-05 | µg/m³ | 0.000001 |
| | | | Exp. Route Total | | | | | | | | 7E-08 | | | | | 0.1 |
| | | Exp. Point Total | | | | | | | | | 7E-08 | | | | | 0.1 |
| | Exp. Medium Total | | | | | | | | | | 7E-08 | | | | | 0.1 |
| Medium Total | | | | | | | | | | | 2E-06 | | | | | 0.5 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 2E-06 | | | | | 0.5 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-23.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.30E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.006 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.07E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.32E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 6.43E-06 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.00006 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.39E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.56E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00008 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.16E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.89E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.06 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.50E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.19E-07 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.81E-06 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.63E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 2.12E-11 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.36E-02 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.01 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.63E-05 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.2 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.80E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.66E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.37E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.01 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.39E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.90E-03 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.06 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.67E-02 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.07 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 4.63E-04 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.02 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.45E-07 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.004 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 4.13E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.02 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.69E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.003 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 7.09E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.75E-05 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.003 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.58E-03 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.09E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.35E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0007 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.04E-09 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0000003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.05E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000003 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.14E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000006 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 7.42E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.06E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.89E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.13E-06 | mg/kg-day | -- | -- | -- |

Table 7-23.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.56E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.84E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0005 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.01E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.16E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0002 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.05E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.02 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.80E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.62E-08 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.91E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.009 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.52E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 3.01E-05 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0009 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 7.39E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 7.32E-06 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.008 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.02E-08 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.0009 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 6.53E-06 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.008 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.67E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.001 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 1.12E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0001 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.77E-07 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.002 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 2.50E-05 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.00008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.07 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.6 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.6 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 4.41E-07 | µg/m³ | 2.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.35E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000005 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.53E-08 | µg/m³ | 3.00E+01 | µg/m³ | 8E-10 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.23E-07 | µg/m³ | 1.00E+03 | µg/m³ | 1E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.58E-08 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000002 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.00E-07 | µg/m³ | 1.00E+02 | µg/m³ | 3E-09 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 9.88E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.62E-07 | µg/m³ | 2.00E-03 | µg/m³ | 0.0002 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.05E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 6.11E-09 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.30E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-13 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.61E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00005 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.27E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.000004 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.53E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.17E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00003 |

Table 7-23.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 8.37E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.0001 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.03E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00002 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 3.65E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.95E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 8.87E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.0002 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 7.90E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00009 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.23E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.35E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000003 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 3.02E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 5.05E-02 | µg/m³ | 2.00E-01 | µg/m³ | 0.3 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 7.86E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.003 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 5.87E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.0002 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.69E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00002 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.45E-04 | µg/m³ | 3.00E+00 | µg/m³ | 0.0002 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.57E-02 | µg/m³ | 1.00E+02 | µg/m³ | 0.0004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 8.32E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 1.11E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.000003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.3 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.9 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.9 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-24.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.16E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0005 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.63E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.001 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.24E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00003 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 6.02E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000006 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.24E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00001 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.47E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000007 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.83E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.77E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.15E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.99E-08 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.57E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.09E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 1.99E-12 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.003 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.28E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 6.22E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.02 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.50E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.55E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.09E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 5.05E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.78E-04 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.005 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 4.38E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.006 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 4.34E-05 | mg/kg-day | 2.40E-02 | mg/kg-day | 0.002 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.05E-08 | mg/kg-day | 1.60E-04 | mg/kg-day | 0.0004 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 3.87E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.58E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0003 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 6.65E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0007 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.64E-06 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.0003 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.48E-04 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.16E-08 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00001 |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.28E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00003 |
| | | | | Benzene | 1.61E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.98E-11 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00000001 |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.16E-08 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0000001 |
| | | | | Naphthalene | 2.91E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.33E-09 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0000002 |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.83E-08 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0000001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.04E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.48E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0005 |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.31E-08 | mg/kg-day | -- | -- | -- |

Table 7-24.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.50E-09 | mg/kg-day | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.99E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.21E-10 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.00002 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | (2) | -- | -- | -- | -- | 3.84E-14 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.00005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.22E-06 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.000008 |
| | | | | Antimony | 8.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.00E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.0007 |
| | | | | Arsenic | 9.74E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.45E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00005 |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | (2) | -- | -- | -- | -- | 9.99E-10 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.00004 |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.63E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0004 |
| | | | | Cobalt | 6.56E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.25E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00001 |
| | | | | Copper | 2.32E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.15E-06 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.00004 |
| | | | | Iron | 5.68E+04 | mg/kg | (2) | -- | -- | -- | -- | 2.82E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00004 |
| | | | | Manganese | 5.63E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.79E-07 | mg/kg-day | 9.60E-04 | mg/kg-day | 0.0003 |
| | | | | Mercury | 7.85E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.89E-10 | mg/kg-day | 1.12E-05 | mg/kg-day | 0.00003 |
| | | | | Nickel | 5.02E+02 | mg/kg | (2) | -- | -- | -- | -- | 2.49E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0003 |
| | | | | Silver | 2.05E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.02E-08 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.00005 |
| | | | | Thallium | 8.63E-02 | mg/kg | (2) | -- | -- | -- | -- | 4.28E-11 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.000004 |
| | | | | Vanadium | 2.13E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.05E-08 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.00008 |
| | | | | Zinc | 1.92E+03 | mg/kg | (2) | -- | -- | -- | -- | 9.52E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | (2) | -- | -- | -- | -- | 4.41E-07 | µg/m³ | 2.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.35E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000005 |
| | | | | Benzene | 1.18E-06 | µg/m³ | (2) | -- | -- | -- | -- | 2.53E-08 | µg/m³ | 3.00E+01 | µg/m³ | 8E-10 |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.23E-07 | µg/m³ | 1.00E+03 | µg/m³ | 1E-10 |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | (2) | -- | -- | -- | -- | 4.58E-08 | µg/m³ | 3.00E+00 | µg/m³ | 0.00000002 |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.00E-07 | µg/m³ | 1.00E+02 | µg/m³ | 3E-09 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | (2) | -- | -- | -- | -- | 9.88E-08 | µg/m³ | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.62E-07 | µg/m³ | 2.00E-03 | µg/m³ | 0.0002 |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.05E-07 | µg/m³ | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | (2) | -- | -- | -- | -- | 6.11E-09 | µg/m³ | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | (2) | -- | -- | -- | -- | 7.30E-08 | µg/m³ | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-09 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | (2) | -- | -- | -- | -- | 4.06E-13 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000001 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.61E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00005 |
| | | | | Antimony | 5.93E-05 | µg/m³ | (2) | -- | -- | -- | -- | 1.27E-06 | µg/m³ | 3.00E-01 | µg/m³ | 0.000004 |
| | | | | Arsenic | 7.16E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.53E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00001 |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.17E-07 | µg/m³ | 1.00E-02 | µg/m³ | 0.00003 |

Table 7-24.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | (2) | -- | -- | -- | -- | 8.37E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.0001 |
| | | | | Cobalt | 4.82E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.03E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00002 |
| | | | | Copper | 1.70E-03 | µg/m³ | (2) | -- | -- | -- | -- | 3.65E-05 | µg/m³ | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.95E-04 | µg/m³ | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | (2) | -- | -- | -- | -- | 8.87E-06 | µg/m³ | 5.00E-02 | µg/m³ | 0.0002 |
| | | | | Mercury | 5.77E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.24E-08 | µg/m³ | 3.00E-01 | µg/m³ | 0.00000004 |
| | | | | Nickel | 3.69E-04 | µg/m³ | (2) | -- | -- | -- | -- | 7.90E-06 | µg/m³ | 9.00E-02 | µg/m³ | 0.00009 |
| | | | | Silver | 1.51E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.23E-07 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.36E-09 | µg/m³ | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | (2) | -- | -- | -- | -- | 3.35E-07 | µg/m³ | 1.00E-01 | µg/m³ | 0.000003 |
| | | | | Zinc | 1.41E-03 | µg/m³ | (2) | -- | -- | -- | -- | 3.02E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | (2) | -- | -- | -- | -- | 5.05E-02 | µg/m³ | 2.00E-01 | µg/m³ | 0.3 |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 7.86E-02 | µg/m³ | 3.00E+01 | µg/m³ | 0.003 |
| | | | | Benzene | 2.74E-01 | µg/m³ | (2) | -- | -- | -- | -- | 5.87E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.0002 |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.69E-02 | µg/m³ | 1.00E+03 | µg/m³ | 0.00002 |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.45E-04 | µg/m³ | 3.00E+00 | µg/m³ | 0.0002 |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | (2) | -- | -- | -- | -- | 3.57E-02 | µg/m³ | 1.00E+02 | µg/m³ | 0.0004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | (2) | -- | -- | -- | -- | 8.32E-06 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | (2) | -- | -- | -- | -- | 1.11E-10 | µg/m³ | 4.00E-05 | µg/m³ | 0.000003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.3 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.3 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.3 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-25.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 2.19E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 6.72E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 1.26E-07 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 6.11E-07 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 2.27E-07 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 1.49E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 6.85E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 2.51E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 7.30E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 4.23E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 5.06E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 8.21E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 2.02E-12 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.30E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 6.30E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 4.57E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 1.58E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 5.80E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 5.12E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 1.81E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 4.44E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 4.40E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 6.14E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 3.92E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 1.61E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 6.74E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 1.66E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 1.50E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-05 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.80E+01 | mg/kg | 9.78E-08 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 6E-09 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 8.60E+01 | mg/kg | 3.00E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.61E+00 | mg/kg | 9.35E-11 | mg/kg-day | 5.50E-02 | 1/(mg/kg-day) | 5E-12 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.82E+00 | mg/kg | 2.73E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.91E+00 | mg/kg | 1.02E-08 | mg/kg-day | 1.20E-01 | 1/(mg/kg-day) | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.90E+01 | mg/kg | 6.65E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 6.27E+00 | mg/kg | 5.57E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 2.30E+01 | mg/kg | 2.04E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 6.69E+00 | mg/kg | 5.94E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |

Table 7-25.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Dibenz(a,h)anthracene | 3.88E-01 | mg/kg | 3.44E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.64E+00 | mg/kg | 4.12E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.05E-01 | mg/kg | 1.22E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 2.58E-05 | mg/kg | 9.01E-14 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.66E+04 | mg/kg | 1.93E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 8.07E+01 | mg/kg | 9.39E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 9.74E+00 | mg/kg | 3.40E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 2.02E+01 | mg/kg | 2.35E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 5.31E+01 | mg/kg | 3.63E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 7E-06 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.56E+00 | mg/kg | 7.63E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Copper | 2.32E+03 | mg/kg | 2.70E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 5.68E+04 | mg/kg | 6.61E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 5.63E+02 | mg/kg | 6.56E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 7.85E-01 | mg/kg | 9.14E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 5.02E+02 | mg/kg | 5.84E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 2.05E+01 | mg/kg | 2.39E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.63E-02 | mg/kg | 1.00E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 2.13E+01 | mg/kg | 2.48E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.92E+03 | mg/kg | 2.24E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.06E-05 | µg/m³ | 4.79E-07 | µg/m³ | 1.60E-05 | m³/µg | 8E-12 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.33E-05 | µg/m³ | 1.47E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 1.18E-06 | µg/m³ | 2.75E-08 | µg/m³ | 7.80E-06 | m³/µg | 2E-13 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 5.75E-06 | µg/m³ | 1.34E-07 | µg/m³ | 2.50E-06 | m³/µg | 3E-13 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 2.14E-06 | µg/m³ | 4.97E-08 | µg/m³ | 3.40E-05 | m³/µg | 2E-12 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.40E-05 | µg/m³ | 3.25E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 4.61E-06 | µg/m³ | 1.02E-07 | µg/m³ | 6.00E-05 | m³/µg | 6E-12 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 1.69E-05 | µg/m³ | 3.73E-07 | µg/m³ | 6.00E-04 | m³/µg | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 4.92E-06 | µg/m³ | 1.08E-07 | µg/m³ | 6.00E-05 | m³/µg | 7E-12 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.85E-07 | µg/m³ | 6.28E-09 | µg/m³ | 6.00E-04 | m³/µg | 4E-12 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.41E-06 | µg/m³ | 7.51E-08 | µg/m³ | 6.00E-05 | m³/µg | 5E-12 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 7.72E-08 | µg/m³ | 1.80E-09 | µg/m³ | 6.90E-05 | m³/µg | 1E-13 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.90E-11 | µg/m³ | 4.41E-13 | µg/m³ | 3.80E+01 | m³/µg | 2E-11 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.22E-02 | µg/m³ | 2.84E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Antimony | 5.93E-05 | µg/m³ | 1.38E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 7.16E-06 | µg/m³ | 1.66E-07 | µg/m³ | 4.30E-03 | m³/µg | 7E-10 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 1.48E-05 | µg/m³ | 3.45E-07 | µg/m³ | 1.80E-03 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |

Table 7-25.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Chromium, Total | 3.91E-05 | µg/m³ | 8.61E-07 | µg/m³ | 1.20E-02 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 4.82E-06 | µg/m³ | 1.12E-07 | µg/m³ | 9.00E-03 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Copper | 1.70E-03 | µg/m³ | 3.96E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 4.18E-02 | µg/m³ | 9.71E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Manganese | 4.14E-04 | µg/m³ | 9.63E-06 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Mercury | 5.77E-07 | µg/m³ | 1.34E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 3.69E-04 | µg/m³ | 8.58E-06 | µg/m³ | 2.60E-04 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Silver | 1.51E-05 | µg/m³ | 3.51E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 6.35E-08 | µg/m³ | 1.48E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.56E-05 | µg/m³ | 3.64E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 1.41E-03 | µg/m³ | 3.28E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-08 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 2E-08 | | | | | -- |
| | | Vapors above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2-Trichloroethane | 2.36E+00 | µg/m³ | 5.48E-02 | µg/m³ | 1.60E-05 | m³/µg | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 3.67E+00 | µg/m³ | 8.54E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzene | 2.74E-01 | µg/m³ | 6.37E-03 | µg/m³ | 7.80E-06 | m³/µg | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Ethylbenzene | 7.87E-01 | µg/m³ | 1.83E-02 | µg/m³ | 2.50E-06 | m³/µg | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Naphthalene | 3.48E-02 | µg/m³ | 8.09E-04 | µg/m³ | 3.40E-05 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Xylenes, Total | 1.67E+00 | µg/m³ | 3.88E-02 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Benzo(a)anthracene | 3.89E-04 | µg/m³ | 8.56E-06 | µg/m³ | 6.00E-05 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 5.19E-09 | µg/m³ | 1.21E-10 | µg/m³ | 3.80E+01 | m³/µg | 5E-09 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-06 | | | | | -- |
| Medium Total | | | | | | | | | | | 7E-05 | | | | | -- |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | 7E-05 | | | | Total of Receptor Hazards Across All Media | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-26.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 3.77E-04 | mg/kg-day | -- | -- | -- | 3.94E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.004 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 4.91E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-08 | 5.13E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 3.50E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 2E-07 | 3.65E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 1.12E-07 | mg/kg-day | -- | -- | -- | 1.17E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Iron | 8.70E+03 | mg/kg | 2.85E-04 | mg/kg-day | -- | -- | -- | 2.98E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.004 |
| | | | | Thallium | 1.09E-01 | mg/kg | 3.57E-09 | mg/kg-day | -- | -- | -- | 3.73E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.07E-05 | mg/kg-day | -- | -- | -- | 1.11E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 6.92E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | 7.23E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0002 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 9.87E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-07 | 1.03E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.001 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.15E-09 | mg/kg-day | -- | -- | -- | 3.30E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Iron | 8.70E+03 | mg/kg | 8.05E-06 | mg/kg-day | -- | -- | -- | 8.41E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0001 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.01E-10 | mg/kg-day | -- | -- | -- | 1.05E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | 5E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 5E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.48E-04 | µg/m³ | -- | -- | -- | 1.55E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0003 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 3.21E-08 | µg/m³ | 4.30E-03 | m³/µg | 1E-10 | 3.35E-07 | µg/m³ | 1.50E-02 | µg/m³ | 0.00002 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 1.37E-07 | µg/m³ | 1.20E-02 | m³/µg | 2E-09 | 1.43E-06 | µg/m³ | 8.00E-03 | µg/m³ | 0.0002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 4.39E-08 | µg/m³ | 9.00E-03 | m³/µg | 4E-10 | 4.58E-07 | µg/m³ | 6.00E-03 | µg/m³ | 0.00008 |
| | | | | Iron | 6.40E-03 | µg/m³ | 1.12E-04 | µg/m³ | -- | -- | -- | 1.17E-03 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.40E-09 | µg/m³ | -- | -- | -- | 1.46E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-09 | | | | | 0.0006 |
| | | Exp. Point Total | | | | | | | | | 2E-09 | | | | | 0.0006 |
| | Exp. Medium Total | | | | | | | | | | 2E-09 | | | | | 0.0006 |
| Medium Total | | | | | | | | | | | 5E-07 | | | | | 0.02 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,2-Dichloroethane | 1.74E-05 | µg/m³ | 3.03E-07 | µg/m³ | 2.60E-05 | m³/µg | 8E-12 | 3.17E-06 | µg/m³ | 7.00E+00 | µg/m³ | 0.0000005 |
| | | | | Benzene | 6.58E-03 | µg/m³ | 1.15E-04 | µg/m³ | 7.80E-06 | m³/µg | 9E-10 | 1.20E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00004 |
| | | | | Chloroform | 1.32E-05 | µg/m³ | 2.31E-07 | µg/m³ | 2.30E-05 | m³/µg | 5E-12 | 2.41E-06 | µg/m³ | 9.77E+01 | µg/m³ | 0.00000002 |
| | | | | cis-1,2-Dichloroethene | 1.68E-04 | µg/m³ | 2.93E-06 | µg/m³ | -- | -- | -- | 3.07E-05 | µg/m³ | -- | -- | -- |
| | | | | Ethylbenzene | 7.36E-03 | µg/m³ | 1.29E-04 | µg/m³ | 2.50E-06 | m³/µg | 3E-10 | 1.34E-03 | µg/m³ | 1.00E+03 | µg/m³ | 0.000001 |
| | | | | Isopropylbenzene | 7.59E-04 | µg/m³ | 1.33E-05 | µg/m³ | -- | -- | -- | 1.39E-04 | µg/m³ | 4.00E+02 | µg/m³ | 0.0000003 |
| | | | | Naphthalene | 3.14E-04 | µg/m³ | 5.49E-06 | µg/m³ | 3.40E-05 | m³/µg | 2E-10 | 5.73E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.00002 |
| | | | | Tetrachloroethene | 1.28E-04 | µg/m³ | 2.24E-06 | µg/m³ | 2.60E-07 | m³/µg | 6E-13 | 2.34E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000006 |
| | | | | Toluene | 2.34E-02 | µg/m³ | 4.08E-04 | µg/m³ | -- | -- | -- | 4.27E-03 | µg/m³ | 5.00E+03 | µg/m³ | 0.0000009 |
| | | | | Trichloroethene | 2.50E-05 | µg/m³ | 4.37E-07 | µg/m³ | 4.10E-06 | m³/µg | 2E-12 | 4.56E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000002 |
| | | | | Xylenes, Total | 1.97E-02 | µg/m³ | 3.44E-04 | µg/m³ | -- | -- | -- | 3.59E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |

Table 7-26.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,1'-Biphenyl | 4.74E-06 | µg/m³ | 8.29E-08 | µg/m³ | -- | -- | -- | 8.66E-07 | µg/m³ | 4.00E-01 | µg/m³ | 0.000002 |
| | | | | 2-Methylnaphthalene | 7.97E-05 | µg/m³ | 1.39E-06 | µg/m³ | -- | -- | -- | 1.46E-05 | µg/m³ | 3.00E+00 | µg/m³ | 0.000005 |
| | | | | Benzo(a)anthracene | 4.53E-09 | µg/m³ | 7.92E-11 | µg/m³ | 6.00E-05 | m³/µg | 5E-15 | 8.28E-10 | µg/m³ | -- | -- | -- |
| | | | | Dibenzofuran | 9.01E-07 | µg/m³ | 1.58E-08 | µg/m³ | -- | -- | -- | 1.65E-07 | µg/m³ | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 9.87E-12 | µg/m³ | 1.73E-13 | µg/m³ | 3.80E+01 | m³/µg | 7E-12 | 1.80E-12 | µg/m³ | 4.00E-05 | µg/m³ | 0.00000005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Mercury | 1.33E-06 | µg/m³ | 2.32E-08 | µg/m³ | -- | -- | -- | 2.42E-07 | µg/m³ | 3.00E-01 | µg/m³ | 0.0000008 |
| | | | Exp. Route Total | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 1E-09 | | | | | 0.0001 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 5E-07 | | | | | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-27.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.47E-04 | mg/kg-day | -- | -- | -- | 1.03E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.001 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 1.92E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-08 | 1.34E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 2.05E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 1E-07 | 9.57E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 4.37E-08 | mg/kg-day | -- | -- | -- | 3.06E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Iron | 8.70E+03 | mg/kg | 1.11E-04 | mg/kg-day | -- | -- | -- | 7.80E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.40E-09 | mg/kg-day | -- | -- | -- | 9.77E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.001 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.005 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.22E-05 | mg/kg-day | -- | -- | -- | 6.45E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0006 |
| | | | | Arsenic | 2.50E+00 | mg/kg | 5.99E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 9E-08 | 4.19E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 8.54E-10 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-08 | 5.98E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.008 |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.73E-08 | mg/kg-day | -- | -- | -- | 1.91E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Iron | 8.70E+03 | mg/kg | 6.96E-05 | mg/kg-day | -- | -- | -- | 4.87E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0007 |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.72E-10 | mg/kg-day | -- | -- | -- | 6.11E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | 2E-07 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 2E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 8.29E-06 | µg/m³ | -- | -- | -- | 5.80E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.00001 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 1.80E-09 | µg/m³ | 4.30E-03 | m³/µg | 8E-12 | 1.26E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.0000008 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 2.30E-08 | µg/m³ | 1.20E-02 | m³/µg | 3E-10 | 5.38E-08 | µg/m³ | 8.00E-03 | µg/m³ | 0.000007 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 2.46E-09 | µg/m³ | 9.00E-03 | m³/µg | 2E-11 | 1.72E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000003 |
| | | | | Iron | 6.40E-03 | µg/m³ | 6.26E-06 | µg/m³ | -- | -- | -- | 4.38E-05 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 7.85E-11 | µg/m³ | -- | -- | -- | 5.49E-10 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-10 | | | | | 0.00002 |
| | | Exp. Point Total | | | | | | | | | 3E-10 | | | | | 0.00002 |
| | Exp. Medium Total | | | | | | | | | | 3E-10 | | | | | 0.00002 |
| Medium Total | | | | | | | | | | | 2E-07 | | | | | 0.02 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 2E-07 | | | | Total of Receptor Hazards Across All Media | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-28.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 9.46E-03 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.009 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.23E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.77E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.80E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 7.15E-03 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.01 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.009 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 1.50E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0001 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 9.73E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0003 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.39E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.002 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.44E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 1.13E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0002 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.42E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.81E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00004 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.93E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000003 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.68E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.37E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000009 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.37E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.72E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.00007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.00007 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.05 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.05 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-29.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 8.87E-04 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.0009 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.15E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 8.22E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.63E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 6.70E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.001 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.40E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | (2) | -- | -- | -- | -- | 5.71E-06 | mg/kg-day | 1.00E+00 | mg/kg-day | 0.000006 |
| | | | | Arsenic | 2.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.71E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00001 |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | (2) | -- | -- | -- | -- | 5.29E-09 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.00007 |
| | | | | Cobalt | 3.41E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.69E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.000006 |
| | | | | Iron | 8.70E+03 | mg/kg | (2) | -- | -- | -- | -- | 4.31E-06 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.000006 |
| | | | | Thallium | 1.09E-01 | mg/kg | (2) | -- | -- | -- | -- | 5.40E-11 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.000005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.004 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.004 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.81E-04 | µg/m³ | 5.00E+00 | µg/m³ | 0.00004 |
| | | | | Arsenic | 1.84E-06 | µg/m³ | (2) | -- | -- | -- | -- | 3.93E-08 | µg/m³ | 1.50E-02 | µg/m³ | 0.000003 |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | (2) | -- | -- | -- | -- | 1.68E-07 | µg/m³ | 8.00E-03 | µg/m³ | 0.00002 |
| | | | | Cobalt | 2.51E-06 | µg/m³ | (2) | -- | -- | -- | -- | 5.37E-08 | µg/m³ | 6.00E-03 | µg/m³ | 0.000009 |
| | | | | Iron | 6.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.37E-04 | µg/m³ | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | (2) | -- | -- | -- | -- | 1.72E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.00007 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.00007 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.004 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.004 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-30.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 9.00E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 1.17E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 1.16E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 2.67E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 6.80E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 8.52E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-06 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 1.15E+04 | mg/kg | 1.34E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 2.50E+00 | mg/kg | 8.71E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 1.07E+01 | mg/kg | 7.29E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 3.41E+00 | mg/kg | 3.97E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Iron | 8.70E+03 | mg/kg | 1.01E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.09E-01 | mg/kg | 1.27E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 7E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 7E-06 | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Aluminum | 8.47E-03 | µg/m³ | 1.97E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.84E-06 | µg/m³ | 4.27E-08 | µg/m³ | 4.30E-03 | m³/µg | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 7.85E-06 | µg/m³ | 1.73E-07 | µg/m³ | 1.20E-02 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 2.51E-06 | µg/m³ | 5.83E-08 | µg/m³ | 9.00E-03 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Iron | 6.40E-03 | µg/m³ | 1.49E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 8.02E-08 | µg/m³ | 1.86E-09 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-09 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 3E-09 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 3E-09 | | | | | -- |
| Medium Total | | | | | | | | | | | 7E-06 | | | | | -- |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 7E-06 | | | | Total of Receptor Hazards Across All Media | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-31.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 3.97E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-08 | 2.78E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 1.36E-06 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 7E-07 | 1.59E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0005 |
| | | | Exp. Route Total | | | | | | | | 7E-07 | | | | | 0.001 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 1.84E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-09 | 1.29E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00004 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 6.33E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 1E-07 | 1.48E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | 0.0002 |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | 2.83E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 7E-11 | 1.98E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.00007 |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | 1.76E-08 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 6E-09 | 1.23E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | 3.68E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-10 | 2.58E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.000009 |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | 3.63E-12 | mg/kg-day | -- | -- | -- | 2.54E-11 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00000003 |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | 1.41E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 7E-09 | 1.64E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000005 |
| | | | | Copper | 6.60E+01 | mg/kg | 3.52E-09 | mg/kg-day | -- | -- | -- | 2.47E-08 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0000008 |
| | | | | Nickel | 9.50E+00 | mg/kg | 5.07E-10 | mg/kg-day | -- | -- | -- | 3.55E-09 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0000002 |
| | | | | Selenium | 2.60E+00 | mg/kg | 1.39E-10 | mg/kg-day | -- | -- | -- | 9.71E-10 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0000002 |
| | | | | Silver | 1.10E+00 | mg/kg | 5.87E-11 | mg/kg-day | -- | -- | -- | 4.11E-10 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00000008 |
| | | | | Zinc | 4.70E+02 | mg/kg | 2.51E-08 | mg/kg-day | -- | -- | -- | 1.76E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0000006 |
| | | | Exp. Route Total | | | | | | | | 1E-08 | | | | | 0.0005 |
| | | Exp. Point Total | | | | | | | | | 9E-07 | | | | | 0.002 |
| | Exp. Medium Total | | | | | | | | | | 9E-07 | | | | | 0.002 |
| Medium Total | | | | | | | | | | | 9E-07 | | | | | 0.002 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 2.91E-08 | mg/kg-day | -- | -- | -- | 2.04E-07 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.0005 |
| | | | | Arsenic | 1.17E-02 | mg/L | 5.50E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 8E-08 | 3.85E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Iron | 1.03E+00 | mg/L | 4.84E-06 | mg/kg-day | -- | -- | -- | 3.39E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00005 |
| | | | Exp. Route Total | | | | | | | | 8E-08 | | | | | 0.002 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 2.15E-09 | mg/kg-day | -- | -- | -- | 1.50E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.0003 |
| | | | | Arsenic | 1.17E-02 | mg/L | 4.06E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-09 | 2.84E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00009 |
| | | | | Iron | 1.03E+00 | mg/L | 3.57E-07 | mg/kg-day | -- | -- | -- | 2.50E-06 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.000004 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0003 |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | 1.65E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-08 | 1.15E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | 5.25E-09 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 3E-09 | 1.32E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000004 |
| | | | | Nickel | 2.90E-04 | mg/kg | 1.36E-09 | mg/kg-day | -- | -- | -- | 9.53E-09 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0000005 |
| | | | | Selenium | 2.36E-03 | mg/kg | 1.11E-08 | mg/kg-day | -- | -- | -- | 7.76E-08 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 3E-08 | | | | | 0.0004 |

Table 7-31.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | 1E-07 | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | 1E-07 | | | | | 0.003 |
| Medium Total | | | | | | | | | | | 1E-07 | | | | | 0.003 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 1E-06 | | | | | 0.005 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-32.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.10E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.77E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.48E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0008 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.83E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.005 |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.21E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0007 |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.37E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.87E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.83E-10 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.0000003 |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.83E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00006 |
| | | | | Copper | 6.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.75E-07 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.000008 |
| | | | | Nickel | 9.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.96E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000002 |
| | | | | Selenium | 2.60E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.08E-08 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.000002 |
| | | | | Silver | 1.10E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.58E-09 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0000009 |
| | | | | Zinc | 4.70E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.96E-06 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.000007 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.005 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.03 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.58E-06 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.006 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 4.87E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.02 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 4.29E-04 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.03E-07 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.002 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 1.95E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0006 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 1.71E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | (2) | -- | -- | -- | -- | 1.46E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | (2) | -- | -- | -- | -- | 1.67E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00006 |
| | | | | Nickel | 2.90E-04 | mg/kg | (2) | -- | -- | -- | -- | 1.21E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000006 |
| | | | | Selenium | 2.36E-03 | mg/kg | (2) | -- | -- | -- | -- | 9.83E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.005 |

Table 7-32.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.03 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 0.06 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-33.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.90E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.66E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.55E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | (2) | -- | -- | -- | -- | 4.06E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.07E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.00007 |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.29E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 2.69E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.000009 |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.65E-11 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00000003 |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.72E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000006 |
| | | | | Copper | 6.60E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.58E-08 | mg/kg-day | 3.25E-02 | mg/kg-day | 0.0000008 |
| | | | | Nickel | 9.50E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.71E-09 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0000002 |
| | | | | Selenium | 2.60E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.02E-09 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0000002 |
| | | | | Silver | 1.10E+00 | mg/kg | (2) | -- | -- | -- | -- | 4.29E-10 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00000009 |
| | | | | Zinc | 4.70E+02 | mg/kg | (2) | -- | -- | -- | -- | 1.83E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0000006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0005 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.003 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.003 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.003 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.55E-07 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.0009 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 6.70E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 5.90E-05 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00008 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.91E-08 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.001 |
| | | | | Arsenic | 1.17E-02 | mg/L | (2) | -- | -- | -- | -- | 1.12E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0004 |
| | | | | Iron | 1.03E+00 | mg/L | (2) | -- | -- | -- | -- | 9.82E-06 | mg/kg-day | 7.00E-01 | mg/kg-day | 0.00001 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.001 |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | (2) | -- | -- | -- | -- | 2.01E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0007 |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | (2) | -- | -- | -- | -- | 2.29E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000008 |
| | | | | Nickel | 2.90E-04 | mg/kg | (2) | -- | -- | -- | -- | 1.66E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0000008 |
| | | | | Selenium | 2.36E-03 | mg/kg | (2) | -- | -- | -- | -- | 1.35E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0007 |

Table 7-33.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.005 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.005 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.005 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 0.008 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-34.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 2.95E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 1.79E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 9E-06 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-06 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.24E+01 | mg/kg | 2.48E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.26E+01 | mg/kg | 1.53E-07 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | -- |
| | | | Ingestion of Blue Crab | | | | | | | | | | | | | |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 5.30E-01 | mg/kg | 2.10E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | 4,4'-DDE | 3.30E+01 | mg/kg | 1.31E-07 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 2.30E+00 | mg/kg | 2.73E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Diet) | 6.80E-01 | mg/kg | 2.69E-11 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.40E+01 | mg/kg | 1.85E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | Copper | 6.60E+01 | mg/kg | 2.61E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nickel | 9.50E+00 | mg/kg | 3.76E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Selenium | 2.60E+00 | mg/kg | 1.03E-09 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Silver | 1.10E+00 | mg/kg | 4.36E-10 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Zinc | 4.70E+02 | mg/kg | 1.86E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-07 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 1E-05 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-05 | | | | | -- |
| Medium Total | | | | | | | | | | | 1E-05 | | | | | -- |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 2.57E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.17E-02 | mg/L | 4.85E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.03E+00 | mg/L | 4.27E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 7E-07 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 6.20E-03 | mg/L | 1.48E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 1.17E-02 | mg/L | 2.78E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Iron | 1.03E+00 | mg/L | 2.45E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-08 | | | | | -- |
| | | | Ingestion of Fish Tissue | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 3.51E-03 | mg/kg | 1.45E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 4.00E-04 | mg/kg | 8.92E-08 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Nickel | 2.90E-04 | mg/kg | 1.20E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Selenium | 2.36E-03 | mg/kg | 9.78E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-07 | | | | | -- |

Table 7-34.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | Exp. Point Total | | | | | | | | | 1E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 1E-06 | | | | | -- |
| Medium Total | | | | | | | | | | | 1E-06 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 1E-05 | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-35.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Maintenance Worker - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 2.62E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | 2.73E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.009 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 9.01E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 5E-07 | 9.42E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | 8E-07 | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 3.69E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-08 | 3.86E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 2.54E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 5E-07 | 2.66E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | 6E-07 | | | | | 0.005 |
| | | Exp. Point Total | | | | | | | | | 1E-06 | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | 1E-06 | | | | | 0.02 |
| Medium Total | | | | | | | | | | | 1E-06 | | | | | 0.02 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 1E-06 | | | | Total of Receptor Hazards Across All Media | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-36.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Trespasser (Teen) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 4.26E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 6E-08 | 2.98E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 8.81E-07 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 4E-07 | 1.03E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | 5E-07 | | | | | 0.001 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 1.98E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 3E-09 | 1.38E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.00005 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 4.09E-09 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 8E-08 | 9.53E-09 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0001 |
| | | | Exp. Route Total | | | | | | | | 8E-08 | | | | | 0.0002 |
| | | Exp. Point Total | | | | | | | | | 6E-07 | | | | | 0.002 |
| | Exp. Medium Total | | | | | | | | | | 6E-07 | | | | | 0.002 |
| Medium Total | | | | | | | | | | | 6E-07 | | | | | 0.002 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 6E-07 | | | | | 0.002 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-37.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Child) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.32E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.15E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.66E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0009 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.83E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.02 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-38.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.12E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 1.07E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.001 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | (2) | -- | -- | -- | -- | 3.80E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | (2) | -- | -- | -- | -- | 2.62E-08 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0005 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.002 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.002 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.002 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.002 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-39.CTE
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 3.16E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 1.15E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-06 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Arsenic | 1.33E+01 | mg/kg | 2.66E-08 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 2.75E+01 | mg/kg | 9.87E-08 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 2E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 8E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 8E-06 | | | | | -- |
| Medium Total | | | | | | | | | | | 8E-06 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 8E-06 | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

# Summary of Chemical Cancer Risks and Non-Cancer Hazards for Constituents of Interest: Central Tendency Exposure

Table 9-1.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 8E-09 | 3E-09 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 2E-08 | 8E-09 | -- | 3E-08 | DV | 0.0008 | 0.0003 | -- | 0.001 |
| | | | Benzo(b)fluoranthene | 5E-09 | 2E-09 | -- | 6E-09 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-08 | 5E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 8E-10 | 2E-10 | -- | 1E-09 | HP | 0.001 | 0.0003 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-07 | 9E-09 | -- | 1E-07 | RP | 0.01 | 0.001 | -- | 0.01 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.007 | 0.0002 | -- | 0.007 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.03 | 0.005 | -- | 0.03 |
| | | | Arsenic | 1E-07 | 2E-08 | -- | 2E-07 | CV; DM | 0.003 | 0.0005 | -- | 0.004 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.007 | 0.0008 | -- | 0.008 |
| | | | Chromium, Total | 3E-06 | 3E-06 | -- | 6E-06 | NA | 0.02 | 0.02 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.01 | 0.0003 | -- | 0.01 |
| | | | Copper | -- | -- | -- | -- | GI | 0.03 | 0.0007 | -- | 0.03 |
| | | | Iron | -- | -- | -- | -- | GI | 0.02 | 0.0007 | -- | 0.02 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.006 | 0.004 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.002 | 0.0007 | -- | 0.002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.009 | 0.006 | -- | 0.01 |
| | | | Silver | -- | -- | -- | -- | DM | 0.004 | 0.003 | -- | 0.006 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.003 | 0.00008 | -- | 0.003 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.001 | 0.002 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.002 | 0.00005 | -- | 0.002 |
| | | | Chemical Total | 3E-06 | 3E-06 | -- | 6E-06 | | 0.2 | 0.05 | -- | 0.2 |
| | | Exposure Point Total | | | | | 6E-06 | | | | | 0.2 |
| | Exposure Medium Total | | | | | | 6E-06 | | | | | 0.2 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 5E-12 | 5E-12 | DV | -- | -- | 0.00005 | 0.00005 |
| | | | Benzo(b)fluoranthene | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 9E-14 | 9E-14 | -- | -- | -- | -- | -- |

Table 9-1.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | 0.00000009 | 0.00000009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0005 | 0.0005 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | Arsenic | -- | -- | 3E-10 | 3E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00004 | 0.00004 |
| | | | Cadmium (Diet) | -- | -- | 5E-10 | 5E-10 | UR | -- | -- | 0.0003 | 0.0003 |
| | | | Chromium, Total | -- | -- | 3E-08 | 3E-08 | RS | -- | -- | 0.003 | 0.003 |
| | | | Cobalt | -- | -- | 1E-09 | 1E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.001 | 0.001 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Nickel | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.0007 | 0.0007 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 3E-08 | 3E-08 | | -- | -- | 0.006 | 0.006 |
| | | Exposure Point Total | | | | | 3E-08 | | | | | 0.006 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | 0.00002 | 0.00002 |
| | | | Chemical Total | -- | -- | 4E-09 | 4E-09 | | -- | -- | 0.00002 | 0.00002 |
| | | Exposure Point Total | | | | | 4E-09 | | | | | 0.000 |
| | Exposure Medium Total | | | | | | 3E-08 | | | | | 0.006 |
| Medium Total | | | | | | | 6E-06 | | | | | 0.2 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 8E-12 | 8E-12 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 9E-10 | 9E-10 | IM | -- | -- | 0.00004 | 0.00004 |
| | | | Chloroform | -- | -- | 5E-12 | 5E-12 | HP | -- | -- | 0.00000002 | 0.00000002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-10 | 3E-10 | DV | -- | -- | 0.000001 | 0.000001 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000003 | 0.0000003 |

Table 9-1.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Naphthalene | -- | -- | 2E-10 | 2E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 6E-13 | 6E-13 | NV | -- | -- | 0.0000006 | 0.0000006 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Trichloroethene | -- | -- | 2E-12 | 2E-12 | DV; IM | -- | -- | 0.000002 | 0.000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 5E-15 | 5E-15 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-12 | 7E-12 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000008 | 0.0000008 |
| | | | Chemical Total | -- | -- | 1E-09 | 1E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 1E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 1E-09 | | | | | 0.0001 |
| Notes: | | | | | | Receptor Risk Total | 6E-06 | | | | Receptor Hazard Index (HI) | 0.2 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.004 |
| Total Dermal (DM) HI across All Media = | 0.02 |
| Total Developmental (DV) HI across All Media = | 0.001 |
| Total Endocrine (EN) HI across All Media = | 0.01 |
| Total Gastrointestinal (GI) HI across All Media = | 0.05 |
| Total Hematological (HM) HI across All Media = | 0.04 |
| Total Hepatic (HP) HI across All Media = | 0.002 |
| Total Immune (IM) HI across All Media = | 0.00004 |
| Total Nervous (NV) HI across All Media = | 0.02 |
| Total Other (OT) HI across All Media = | 0.05 |
| Total Reproductive (RP) HI across All Media = | 0.01 |
| Total Respiratory (RS) HI across All Media = | 0.004 |
| Total Urinary (UR) HI across All Media = | 0.008 |

Table 9-2.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 5E-09 | 3E-10 | -- | 5E-09 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 1E-08 | 7E-10 | -- | 1E-08 | DV | 0.0002 | 0.002 | -- | 0.002 |
| | | | Benzo(b)fluoranthene | 3E-09 | 1E-10 | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 7E-09 | 4E-10 | -- | 8E-09 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 3E-10 | 2E-09 | -- | 2E-09 | HP | 0.0003 | 0.002 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 4E-08 | 8E-08 | -- | 1E-07 | RP | 0.003 | 0.006 | -- | 0.009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.002 | 0.001 | -- | 0.003 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.007 | 0.03 | -- | 0.04 |
| | | | Arsenic | 6E-08 | 2E-07 | -- | 2E-07 | CV; DM | 0.0009 | 0.003 | -- | 0.004 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.002 | 0.005 | -- | 0.006 |
| | | | Chromium, Total | 2E-06 | 3E-07 | -- | 2E-06 | NA | 0.005 | 0.1 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.003 | 0.002 | -- | 0.005 |
| | | | Copper | -- | -- | -- | -- | GI | 0.007 | 0.004 | -- | 0.01 |
| | | | Iron | -- | -- | -- | -- | GI | 0.006 | 0.004 | -- | 0.01 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.002 | 0.02 | -- | 0.03 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.0004 | 0.004 | -- | 0.004 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.002 | 0.04 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0009 | 0.01 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0008 | 0.0005 | -- | 0.001 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.0004 | 0.009 | -- | 0.009 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0005 | 0.0003 | -- | 0.0008 |
| | | | Chemical Total | 2E-06 | 5E-07 | -- | 2E-06 | | 0.04 | 0.3 | -- | 0.3 |
| | | Exposure Point Total | | | | | 2E-06 | | | | | 0.3 |
| | Exposure Medium Total | | | | | | 2E-06 | | | | | 0.3 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 3E-13 | 3E-13 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 9E-13 | 9E-13 | DV | -- | -- | 0.000002 | 0.000002 |
| | | | Benzo(b)fluoranthene | -- | -- | 2E-13 | 2E-13 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 5E-13 | 5E-13 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 5E-15 | 5E-15 | -- | -- | -- | -- | -- |

Table 9-2.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-13 | 7E-13 | -- | -- | -- | 0.000000003 | 0.000000003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.0000006 | 0.0000006 |
| | | | Arsenic | -- | -- | 2E-11 | 2E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000002 | 0.000002 |
| | | | Cadmium (Diet) | -- | -- | 3E-11 | 3E-11 | UR | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | 4E-09 | 4E-09 | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cobalt | -- | -- | 7E-11 | 7E-11 | RS | -- | -- | 0.000009 | 0.000009 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Nickel | -- | -- | 9E-11 | 9E-11 | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000001 | 0.000001 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 5E-09 | 5E-09 | | -- | -- | 0.0002 | 0.0002 |
| | | Exposure Point Total | | | | | 5E-09 | | | | | 0.0002 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 4E-11 | 4E-11 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | 0.000001 | 0.000001 |
| | | | Chemical Total | -- | -- | 4E-10 | 4E-10 | | -- | -- | 0.000001 | 0.000001 |
| | | Exposure Point Total | | | | | 4E-10 | | | | | 0.000 |
| | Exposure Medium Total | | | | | | 5E-09 | | | | | 0.0002 |
| Medium Total | | | | | | | 2E-06 | | | | | 0.3 |
| Notes: | | | | | | Receptor Risk Total | 2E-06 | | | | Receptor Hazard Index (HI) | 0.3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.004 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.002 |
| Total Endocrine (EN) HI across All Media = | 0.005 |
| Total Gastrointestinal (GI) HI across All Media = | 0.02 |
| Total Hematological (HM) HI across All Media = | 0.04 |

Table 9-2.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.002 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.08 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.01 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.0001 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.006 |

Table 9-3.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.002 | 0.0004 | -- | 0.002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.003 | 0.0005 | -- | 0.003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.03 | 0.001 | -- | 0.03 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.02 | 0.0003 | -- | 0.02 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.07 | 0.007 | -- | 0.07 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.008 | 0.0007 | -- | 0.009 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.02 | 0.001 | -- | 0.02 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.05 | 0.03 | -- | 0.07 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.03 | 0.0004 | -- | 0.03 |
| | | | Copper | -- | -- | -- | -- | GI | 0.06 | 0.001 | -- | 0.06 |
| | | | Iron | -- | -- | -- | -- | GI | 0.06 | 0.0009 | -- | 0.06 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.01 | 0.006 | -- | 0.02 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.004 | 0.0009 | -- | 0.005 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.008 | -- | 0.03 |
| | | | Silver | -- | -- | -- | -- | DM | 0.009 | 0.003 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.0001 | -- | 0.007 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.003 | 0.002 | -- | 0.006 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.005 | 0.00007 | -- | 0.005 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.4 | 0.06 | -- | 0.5 |
| | | Exposure Point Total | | | | | -- | | | | | 0.5 |
| Exposure Medium Total | | | | | | | -- | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-3.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000001 | 0.00000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000004 | 0.00000004 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000003 | 0.000003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.000003 | 0.000003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.000003 | 0.000003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0007 |
| Medium Total | | | | | | | -- | | | | | 0.5 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.5 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.009 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.002 |
| Total Endocrine (EN) HI across All Media = | 0.03 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.08 |

Table 9-3.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.003 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 0.04 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.1 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.03 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.0005 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.02 |

Table 9-4.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.0002 | 0.00001 | -- | 0.0002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.0003 | 0.00002 | -- | 0.0003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.003 | 0.00005 | -- | 0.003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.002 | 0.00001 | -- | 0.002 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.006 | 0.0003 | -- | 0.007 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.0008 | 0.00002 | -- | 0.0008 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.002 | 0.00004 | -- | 0.002 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.004 | 0.001 | -- | 0.005 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.003 | 0.00002 | -- | 0.003 |
| | | | Copper | -- | -- | -- | -- | GI | 0.006 | 0.00004 | -- | 0.006 |
| | | | Iron | -- | -- | -- | -- | GI | 0.005 | 0.00003 | -- | 0.005 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.001 | 0.0002 | -- | 0.002 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.0004 | 0.00003 | -- | 0.0004 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.002 | 0.0003 | -- | 0.002 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0008 | 0.0001 | -- | 0.0009 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0007 | 0.000004 | -- | 0.0007 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.0003 | 0.00008 | -- | 0.0004 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0004 | 0.000003 | -- | 0.0004 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.04 | 0.002 | -- | 0.04 |
| | | Exposure Point Total | | | | | -- | | | | | 0.04 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.04 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-4.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000001 | 0.00000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000004 | 0.00000004 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000003 | 0.000003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.000003 | 0.000003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.000003 | 0.000003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0007 |
| Medium Total | | | | | | | -- | | | | | 0.04 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.04 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.0008 |
| Total Dermal (DM) HI across All Media = | 0.003 |
| Total Developmental (DV) HI across All Media = | 0.0002 |
| Total Endocrine (EN) HI across All Media = | 0.003 |
| Total Gastrointestinal (GI) HI across All Media = | 0.01 |
| Total Hematological (HM) HI across All Media = | 0.007 |

Table 9-4.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.0003 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 0.003 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.009 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.003 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.0005 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.002 |

Table 9-5.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 8E-07 | 6E-08 | -- | 8E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 2E-07 | 1E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 4E-07 | 3E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 2E-09 | 3E-10 | -- | 2E-09 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-07 | 1E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 4E-07 | 3E-08 | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 9E-05 | 2E-05 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 9E-05 | 2E-05 | -- | 1E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-04 | | | | | -- |
| Exposure Medium Total | | | | | | | 1E-04 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 7E-12 | 7E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 4E-12 | 4E-12 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 1E-13 | 1E-13 | -- | -- | -- | -- | -- |

Table 9-5.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 4E-10 | 4E-10 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 4E-08 | 4E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 4E-08 | | | | | -- |
| | | Vapors above Site | | | | | | | | | | |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-09 | 5E-09 | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 5E-09 | 5E-09 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 5E-09 | | | | | -- |
| | Exposure Medium Total | | | | | | 4E-08 | | | | | -- |
| Medium Total | | | | | | | 1E-04 | | | | | -- |
| | | | | | | Receptor Risk Total | 1E-04 | | | | Receptor Hazard Index (HI) | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-6.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.004 | 0.0001 | -- | 0.004 |
| | | | Arsenic | 9E-08 | 1E-08 | -- | 1E-07 | CV; DM | 0.002 | 0.0003 | -- | 0.002 |
| | | | Chromium, Total | 2E-07 | 2E-07 | -- | 4E-07 | NA | 0.001 | 0.001 | -- | 0.003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.004 | 0.0001 | -- | 0.004 |
| | | | Iron | -- | -- | -- | -- | GI | 0.004 | 0.0001 | -- | 0.004 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.004 | 0.0001 | -- | 0.004 |
| | | | Chemical Total | 3E-07 | 2E-07 | -- | 5E-07 | | 0.02 | 0.002 | -- | 0.02 |
| | | Exposure Point Total | | | | | 5E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 5E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Arsenic | -- | -- | 2E-10 | 2E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Cobalt | -- | -- | 4E-10 | 4E-10 | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-09 | 2E-09 | | -- | -- | 0.0006 | 0.0006 |
| | | Exposure Point Total | | | | | 2E-09 | | | | | 0.0006 |
| | Exposure Medium Total | | | | | | 2E-09 | | | | | 0.0006 |
| Medium Total | | | | | | | 5E-07 | | | | | 0.02 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 8E-12 | 8E-12 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 9E-10 | 9E-10 | IM | -- | -- | 0.00004 | 0.00004 |
| | | | Chloroform | -- | -- | 5E-12 | 5E-12 | HP | -- | -- | 0.00000002 | 0.00000002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-10 | 3E-10 | DV | -- | -- | 0.000001 | 0.000001 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000003 | 0.0000003 |
| | | | Naphthalene | -- | -- | 2E-10 | 2E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 6E-13 | 6E-13 | NV | -- | -- | 0.0000006 | 0.0000006 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Trichloroethene | -- | -- | 2E-12 | 2E-12 | DV; IM | -- | -- | 0.000002 | 0.000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |

Table 9-6.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Maintenance Worker - Surface Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 5E-15 | 5E-15 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-12 | 7E-12 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000008 | 0.0000008 |
| | | | Chemical Total | -- | -- | 1E-09 | 1E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 1E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 1E-09 | | | | | 0.0001 |
| | | | | | | Receptor Risk Total | 5E-07 | | | | Receptor Hazard Index (HI) | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.006 |
| Total Developmental (DV) HI across All Media = | 0.00003 |
| Total Endocrine (EN) HI across All Media = | 0.004 |
| Total Gastrointestinal (GI) HI across All Media = | 0.004 |
| Total Hepatic (HP) HI across All Media = | 0.000002 |
| Total Immune (IM) HI across All Media = | 0.00004 |
| Total Nervous (NV) HI across All Media = | 0.004 |
| Total Reproductive (RP) HI across All Media = | 0.00003 |
| Total Respiratory (RS) HI across All Media = | 0.0003 |
| Total Urinary (UR) HI across All Media = | 0.000002 |

Table 9-7.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Current On-Site Trespasser (Teen) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.001 | 0.0006 | -- | 0.002 |
| | | | Arsenic | 3E-08 | 1E-07 | -- | 1E-07 | CV; DM | 0.0005 | 0.002 | -- | 0.002 |
| | | | Chromium, Total | 1E-07 | 2E-08 | -- | 1E-07 | NA | 0.0003 | 0.008 | -- | 0.008 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.001 | 0.0006 | -- | 0.002 |
| | | | Iron | -- | -- | -- | -- | GI | 0.001 | 0.0007 | -- | 0.002 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.0006 | -- | 0.002 |
| | | | Chemical Total | 1E-07 | 1E-07 | -- | 3E-07 | | 0.005 | 0.01 | -- | 0.02 |
| | | Exposure Point Total | | | | | 3E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 3E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00001 | 0.00001 |
| | | | Arsenic | -- | -- | 9E-12 | 9E-12 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000001 | 0.000001 |
| | | | Chromium, Total | -- | -- | 3E-10 | 3E-10 | RS | -- | -- | 0.000007 | 0.000007 |
| | | | Cobalt | -- | -- | 2E-11 | 2E-11 | RS | -- | -- | 0.000003 | 0.000003 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 3E-10 | 3E-10 | | -- | -- | 0.00002 | 0.00002 |
| | | Exposure Point Total | | | | | 3E-10 | | | | | 0.00002 |
| | Exposure Medium Total | | | | | | 3E-10 | | | | | 0.00002 |
| Medium Total | | | | | | | 3E-07 | | | | | 0.02 |
| Notes: | | | | | | Receptor Risk Total | 3E-07 | | | | Receptor Hazard Index (HI) | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.004 |
| Total Developmental (DV) HI across All Media = | 0.000001 |
| Total Endocrine (EN) HI across All Media = | 0.002 |
| Total Gastrointestinal (GI) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.002 |
| Total Reproductive (RP) HI across All Media = | 0.000001 |
| Total Respiratory (RS) HI across All Media = | 0.00001 |

Table 9-8.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Child) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.009 | 0.0001 | -- | 0.01 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.005 | 0.0004 | -- | 0.005 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.003 | 0.002 | -- | 0.005 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.009 | 0.0001 | -- | 0.009 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.0002 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.009 | 0.0001 | -- | 0.009 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.003 | -- | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.000009 | 0.000009 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.00007 | 0.00007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.00007 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | -- | | | | | 0.05 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.05 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.005 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.000003 |
| Total Endocrine (EN) HI across All Media = | 0.009 |
| Total Gastrointestinal (GI) HI across All Media = | 0.01 |
| Total Nervous (NV) HI across All Media = | 0.01 |
| Total Reproductive (RP) HI across All Media = | 0.000003 |
| Total Respiratory (RS) HI across All Media = | 0.00003 |

Table 9-9.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Adult) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.0009 | 0.000006 | -- | 0.0009 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.0005 | 0.00001 | -- | 0.0005 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.0003 | 0.00007 | -- | 0.0003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0009 | 0.000006 | -- | 0.0009 |
| | | | Iron | -- | -- | -- | -- | GI | 0.001 | 0.000006 | -- | 0.001 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0008 | 0.000005 | -- | 0.0008 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.004 | 0.0001 | -- | 0.004 |
| | | Exposure Point Total | | | | | -- | | | | | 0.004 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.004 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.000009 | 0.000009 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.00007 | 0.00007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.00007 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | -- | | | | | 0.004 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.004 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.0005 |
| Total Dermal (DM) HI across All Media = | 0.001 |
| Total Developmental (DV) HI across All Media = | 0.000003 |
| Total Endocrine (EN) HI across All Media = | 0.0009 |
| Total Gastrointestinal (GI) HI across All Media = | 0.001 |
| Total Nervous (NV) HI across All Media = | 0.0009 |
| Total Reproductive (RP) HI across All Media = | 0.000003 |
| Total Respiratory (RS) HI across All Media = | 0.00003 |

Table 9-10.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Current On-Site Outdoor Recreator (Lifetime) - Surface Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Surface Soil | Surface Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 2E-07 | 2E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 6E-06 | 1E-06 | -- | 7E-06 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 6E-06 | 1E-06 | -- | 7E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-06 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 3E-09 | 3E-09 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 3E-09 | | | | | -- |
| | Exposure Medium Total | | | | | | 3E-09 | | | | | -- |
| Medium Total | | | | | | | 7E-06 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 7E-06 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-11.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 7E-08 | 3E-09 | -- | 7E-08 | HM; IM | 0.003 | 0.0001 | -- | 0.003 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.007 | 0.0003 | -- | 0.008 |
| | | | Benzene | 4E-09 | 3E-12 | -- | 4E-09 | IM | 0.0002 | 0.0000001 | -- | 0.0002 |
| | | | Ethylbenzene | 4E-09 | 1E-10 | -- | 4E-09 | HP; UR | 0.00003 | 0.000001 | -- | 0.00003 |
| | | | Naphthalene | 1E-08 | 6E-10 | -- | 1E-08 | OT | 0.00006 | 0.000003 | -- | 0.00006 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00004 | 0.000002 | -- | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 3E-08 | 5E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 9E-07 | 2E-07 | -- | 1E-06 | DV | 0.03 | 0.006 | -- | 0.04 |
| | | | Benzo(b)fluoranthene | 3E-08 | 5E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 2E-08 | 3E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 2E-08 | 3E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 1E-09 | 1E-10 | -- | 1E-09 | HP | 0.001 | 0.0002 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-07 | 6E-09 | -- | 1E-07 | RP | 0.02 | 0.0007 | -- | 0.02 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.007 | 0.0001 | -- | 0.007 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.09 | 0.008 | -- | 0.09 |
| | | | Arsenic | 4E-07 | 3E-08 | -- | 4E-07 | CV; DM | 0.008 | 0.0006 | -- | 0.009 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.009 | 0.0005 | -- | 0.009 |
| | | | Chromium, Total | 1E-06 | 6E-07 | -- | 2E-06 | NA | 0.008 | 0.004 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.009 | 0.0001 | -- | 0.009 |
| | | | Copper | -- | -- | -- | -- | GI | 0.03 | 0.0004 | -- | 0.03 |
| | | | Iron | -- | -- | -- | -- | GI | 0.03 | 0.0005 | -- | 0.04 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.01 | 0.004 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.002 | 0.0004 | -- | 0.003 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.01 | 0.004 | -- | 0.01 |
| | | | Silver | -- | -- | -- | -- | DM | 0.002 | 0.0006 | -- | 0.002 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.004 | 0.00005 | -- | 0.004 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.002 | 0.001 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.003 | 0.00004 | -- | 0.003 |
| | | | Chemical Total | 3E-06 | 8E-07 | -- | 4E-06 | | 0.3 | 0.03 | -- | 0.3 |
| | | Exposure Point Total | | | | | 4E-06 | | | | | 0.3 |
| | Exposure Medium Total | | | | | | 4E-06 | | | | | 0.3 |

Table 9-11.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 4E-12 | 4E-12 | RS | -- | -- | 0.00001 | 0.00001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Benzene | -- | -- | 1E-13 | 1E-13 | IM | -- | -- | 0.000000004 | 0.000000004 |
| | | | Ethylbenzene | -- | -- | 2E-13 | 2E-13 | DV | -- | -- | 7E-10 | 7E-10 |
| | | | Naphthalene | -- | -- | 8E-13 | 8E-13 | NV; RS | -- | -- | 0.00000008 | 0.00000008 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000002 | 0.00000002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 1E-10 | 1E-10 | DV | -- | -- | 0.001 | 0.001 |
| | | | Benzo(b)fluoranthene | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 6E-14 | 6E-14 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 8E-12 | 8E-12 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | 3E-10 | 3E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00005 | 0.00005 |
| | | | Cadmium (Diet) | -- | -- | 3E-10 | 3E-10 | UR | -- | -- | 0.0002 | 0.0002 |
| | | | Chromium, Total | -- | -- | 5E-09 | 5E-09 | RS | -- | -- | 0.0006 | 0.0006 |
| | | | Cobalt | -- | -- | 5E-10 | 5E-10 | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0009 | 0.0009 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | 1E-09 | 1E-09 | RS | -- | -- | 0.0005 | 0.0005 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 7E-09 | 7E-09 | | -- | -- | 0.004 | 0.004 |
| | | Exposure Point Total | | | | | 7E-09 | | | | | 0.004 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-11.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 4E-07 | 4E-07 | RS | -- | -- | 1 | 1 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | 2E-08 | 2E-08 | IM | -- | -- | 0.001 | 0.001 |
| | | | Ethylbenzene | -- | -- | 2E-08 | 2E-08 | DV | -- | -- | 0.00009 | 0.00009 |
| | | | Naphthalene | -- | -- | 1E-08 | 1E-08 | NV; RS | -- | -- | 0.001 | 0.001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | 0.00002 | 0.00002 |
| | | | Chemical Total | -- | -- | 5E-07 | 5E-07 | | -- | -- | 1 | 1 |
| | | Exposure Point Total | | | | | 5E-07 | | | | | 1.000 |
| | Exposure Medium Total | | | | | | 5E-07 | | | | | 1 |
| Medium Total | | | | | | | 4E-06 | | | | | 2 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 5E-12 | 5E-12 | NV | -- | -- | 0.0000003 | 0.0000003 |
| | | | Benzene | -- | -- | 6E-10 | 6E-10 | IM | -- | -- | 0.00003 | 0.00003 |
| | | | Chloroform | -- | -- | 3E-12 | 3E-12 | HP | -- | -- | 0.00000002 | 0.00000002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-10 | 2E-10 | DV | -- | -- | 0.0000008 | 0.0000008 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000002 | 0.0000002 |
| | | | Naphthalene | -- | -- | 1E-10 | 1E-10 | NV; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Tetrachloroethene | -- | -- | 4E-13 | 4E-13 | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Trichloroethene | -- | -- | 1E-12 | 1E-12 | DV; IM | -- | -- | 0.000001 | 0.000001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000001 | 0.000001 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Benzo(a)anthracene | -- | -- | 3E-15 | 3E-15 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-12 | 4E-12 | -- | -- | -- | 0.00000003 | 0.00000003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000005 | 0.0000005 |

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Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chemical Total | -- | -- | 9E-10 | 9E-10 | | -- | -- | 0.00007 | 0.00007 |
| | | Exposure Point Total | | | | | 9E-10 | | | | | 0.00007 |
| | Exposure Medium Total | | | | | | 9E-10 | | | | | 0.00007 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 2E-07 | 2E-07 | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | 4E-05 | 4E-05 | IM | -- | -- | 2 | 2 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.06 | 0.06 |
| | | | Ethylbenzene | -- | -- | 1E-05 | 1E-05 | DV | -- | -- | 0.05 | 0.05 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.01 | 0.01 |
| | | | Naphthalene | -- | -- | 8E-07 | 8E-07 | NV; RS | -- | -- | 0.08 | 0.08 |
| | | | Tetrachloroethene | -- | -- | 3E-08 | 3E-08 | NV | -- | -- | 0.03 | 0.03 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.06 | 0.06 |
| | | | Trichloroethene | -- | -- | 6E-08 | 6E-08 | DV; IM | -- | -- | 0.08 | 0.08 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 1 | 1 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.02 | 0.02 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.04 | 0.04 |
| | | | Chemical Total | -- | -- | 5E-05 | 5E-05 | | -- | -- | 4 | 4 |
| | | Exposure Point Total | | | | | 5E-05 | | | | | 4 |
| | Exposure Medium Total | | | | | | 5E-05 | | | | | 4 |
| Medium Total | | | | | | | 5E-05 | | | | | 4 |
| | | | | | | Receptor Risk Total | 6E-05 | | | | Receptor Hazard Index (HI) | 5 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.009 |
| Total Dermal (DM) HI across All Media = | 0.02 |
| Total Developmental (DV) HI across All Media = | 0.2 |
| Total Endocrine (EN) HI across All Media = | 0.02 |
| Total Gastrointestinal (GI) HI across All Media = | 0.07 |
| Total Hematological (HM) HI across All Media = | 0.1 |
| Total Hepatic (HP) HI across All Media = | 0.02 |
| Total Immune (IM) HI across All Media = | 2 |
| Total Nervous (NV) HI across All Media = | 2 |
| Total Other (OT) HI across All Media = | 0.1 |
| Total Reproductive (RP) HI across All Media = | 0.02 |
| Total Respiratory (RS) HI across All Media = | 1 |

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| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.03 |

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|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 5E-09 | 5E-10 | -- | 5E-09 | HP | 0.003 | 0.0003 | -- | 0.003 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.007 | 0.0008 | -- | 0.008 |
| | | | Benzene | 3E-10 | 5E-13 | -- | 3E-10 | HM | 0.00007 | 0.0000001 | -- | 0.00007 |
| | | | Ethylbenzene | 3E-10 | 3E-11 | -- | 3E-10 | HP | 0.00007 | 0.000007 | -- | 0.00007 |
| | | | Naphthalene | 1E-09 | 1E-10 | -- | 1E-09 | NV | 0.000002 | 0.0000002 | -- | 0.000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00002 | 0.000002 | -- | 0.00002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 2E-09 | 9E-10 | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 7E-08 | 3E-08 | -- | 1E-07 | DV | 0.03 | 0.02 | -- | 0.05 |
| | | | Benzo(b)fluoranthene | 2E-09 | 9E-10 | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-09 | 5E-10 | -- | 2E-09 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 1E-09 | 6E-10 | -- | 2E-09 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 8E-11 | 3E-11 | -- | 1E-10 | HP | 0.001 | 0.0005 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-08 | 1E-09 | -- | 1E-08 | IM | 0.0006 | 0.00006 | -- | 0.0006 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.007 | 0.0003 | -- | 0.007 |
| | | | Antimony | -- | -- | -- | -- | OT | 0.09 | 0.02 | -- | 0.1 |
| | | | Arsenic | 3E-08 | 5E-09 | -- | 3E-08 | DM | 0.0005 | 0.00009 | -- | 0.0006 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | MS | 0.02 | 0.002 | -- | 0.02 |
| | | | Chromium, Total | 8E-08 | 1E-07 | -- | 2E-07 | HM | 0.005 | 0.006 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0009 | 0.00003 | -- | 0.001 |
| | | | Copper | -- | -- | -- | -- | GI | 0.1 | 0.003 | -- | 0.1 |
| | | | Iron | -- | -- | -- | -- | GI | 0.03 | 0.001 | -- | 0.04 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.01 | 0.009 | -- | 0.02 |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | OT | 0.01 | 0.009 | -- | 0.02 |
| | | | Silver | -- | -- | -- | -- | DM | 0.002 | 0.002 | -- | 0.003 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0009 | 0.00003 | -- | 0.001 |
| | | | Vanadium | -- | -- | -- | -- | HM | 0.0009 | 0.001 | -- | 0.002 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.003 | 0.0001 | -- | 0.003 |
| | | | Chemical Total | 2E-07 | 2E-07 | -- | 4E-07 | | 0.3 | 0.07 | -- | 0.4 |
| | | Exposure Point Total | | | | | 4E-07 | | | | | 0.4 |
| | Exposure Medium Total | | | | | | 4E-07 | | | | | 0.4 |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-11 | 3E-11 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00003 | 0.00003 |
| | | | Benzene | -- | -- | 1E-12 | 1E-12 | HM | -- | -- | 0.0000002 | 0.0000002 |
| | | | Ethylbenzene | -- | -- | 2E-12 | 2E-12 | OT | -- | -- | 0.000000009 | 0.000000009 |
| | | | Naphthalene | -- | -- | 8E-12 | 8E-12 | NV; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 0.0000005 | 0.0000005 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 1E-09 | 1E-09 | DV | -- | -- | 0.1 | 0.1 |
| | | | Benzo(b)fluoranthene | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 6E-13 | 6E-13 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 8E-11 | 8E-11 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.04 | 0.04 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.0009 | 0.0009 |
| | | | Arsenic | -- | -- | 3E-09 | 3E-09 | CV; DM; DV; NV; RP; RS | -- | -- | 0.007 | 0.007 |
| | | | Cadmium (Diet) | -- | -- | 3E-09 | 3E-09 | UR | -- | -- | 0.0002 | 0.0002 |
| | | | Chromium, Total | -- | -- | 5E-08 | 5E-08 | RS | -- | -- | 0.002 | 0.002 |
| | | | Cobalt | -- | -- | 5E-09 | 5E-09 | RS | -- | -- | 0.004 | 0.004 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00003 | 0.00003 |
| | | | Nickel | -- | -- | 1E-08 | 1E-08 | RS | -- | -- | 0.03 | 0.03 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 7E-08 | 7E-08 | | -- | -- | 0.3 | 0.3 |
| | | Exposure Point Total | | | | | 7E-08 | | | | | 0.3 |
| | | Vapors above Site | | | | | | | | | | |

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|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 2E-07 | 2E-07 | RS | -- | -- | 0.8 | 0.8 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.09 | 0.09 |
| | | | Benzene | -- | -- | 1E-08 | 1E-08 | HM | -- | -- | 0.002 | 0.002 |
| | | | Ethylbenzene | -- | -- | 1E-08 | 1E-08 | OT | -- | -- | 0.00006 | 0.00006 |
| | | | Naphthalene | -- | -- | 6E-09 | 6E-09 | NV; RS | -- | -- | 0.008 | 0.008 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 0.003 | 0.003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-07 | 2E-07 | | -- | -- | 0.9 | 0.9 |
| | | Exposure Point Total | | | | | 2E-07 | | | | | 0.900 |
| | Exposure Medium Total | | | | | | 3E-07 | | | | | 1 |
| Medium Total | | | | | | | 6E-07 | | | | | 2 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 4E-11 | 8E-11 | -- | 1E-10 | UR | 0.000003 | 0.000007 | -- | 0.00001 |
| | | | Benzene | 5E-09 | 3E-08 | -- | 4E-08 | HM | 0.001 | 0.008 | -- | 0.009 |
| | | | Chloroform | 7E-12 | 2E-11 | -- | 3E-11 | HP | 0.0000003 | 0.000001 | -- | 0.000001 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.00002 | 0.00009 | -- | 0.0001 |
| | | | Ethylbenzene | 1E-09 | 3E-08 | -- | 3E-08 | HP | 0.0003 | 0.007 | -- | 0.007 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.000004 | 0.0002 | -- | 0.0002 |
| | | | Naphthalene | 2E-09 | 5E-08 | -- | 5E-08 | NV | 0.000004 | 0.0001 | -- | 0.0001 |
| | | | Tetrachloroethene | 3E-12 | 6E-11 | -- | 6E-11 | NV | 0.00002 | 0.0005 | -- | 0.0005 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.00006 | 0.0008 | -- | 0.0009 |
| | | | Trichloroethene | 1E-11 | 8E-11 | -- | 1E-10 | DV; IM | 0.00008 | 0.0005 | -- | 0.0006 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0001 | 0.003 | -- | 0.003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 4E-12 | 2E-10 | -- | 2E-10 | DV | 0.0000006 | 0.00003 | -- | 0.00004 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.0002 | 0.009 | -- | 0.01 |
| | | | Benzo(a)anthracene | 5E-12 | -- | -- | 5E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 4E-11 | -- | -- | 4E-11 | DV | 0.00002 | -- | -- | 0.00002 |
| | | | Benzo(b)fluoranthene | 4E-12 | -- | -- | 4E-12 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.000005 | 0.0003 | -- | 0.0003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 9E-10 | -- | -- | 9E-10 | IM | 0.00005 | -- | -- | 0.00005 |

Table 9-12.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.0004 | 0.0001 | -- | 0.0006 |
| | | | Antimony | -- | -- | -- | -- | OT | 0.0001 | 0.0003 | -- | 0.0004 |
| | | | Arsenic | 4E-09 | 1E-09 | -- | 5E-09 | DM | 0.00007 | 0.00002 | -- | 0.0001 |
| | | | Barium | -- | -- | -- | -- | UR | 0.00001 | 0.00006 | -- | 0.00007 |
| | | | Beryllium | -- | -- | -- | -- | -- | 0.00005 | 0.002 | -- | 0.002 |
| | | | Cadmium (Water) | -- | -- | -- | -- | MS | 0.00006 | 0.0004 | -- | 0.0005 |
| | | | Chromium, Total | 2E-09 | 5E-08 | -- | 6E-08 | HM | 0.0001 | 0.003 | -- | 0.003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0001 | 0.00001 | -- | 0.0001 |
| | | | Iron | -- | -- | -- | -- | GI | 0.0009 | 0.0003 | -- | 0.001 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.001 | 0.01 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.0005 | -- | 0.002 |
| | | | Vanadium | -- | -- | -- | -- | HM | 0.00005 | 0.0006 | -- | 0.0007 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.00002 | 0.000003 | -- | 0.00002 |
| | | | Chemical Total | 2E-08 | 2E-07 | -- | 2E-07 | | 0.007 | 0.05 | -- | 0.06 |
| | | Exposure Point Total | | | | | 2E-07 | | | | | 0.06 |
| | Exposure Medium Total | | | | | | 2E-07 | | | | | 0.06 |
| | Outdoor Air | Trench (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 7E-08 | 7E-08 | NV | -- | -- | 0.005 | 0.005 |
| | | | Benzene | -- | -- | 4E-06 | 4E-06 | HM | -- | -- | 1 | 1 |
| | | | Chloroform | -- | -- | 3E-08 | 3E-08 | HP | -- | -- | 0.0007 | 0.0007 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-06 | 2E-06 | OT | -- | -- | 0.009 | 0.009 |
| | | | Isopropylbenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.09 | 0.09 |
| | | | Naphthalene | -- | -- | 3E-06 | 3E-06 | NV; RS | -- | -- | 4 | 4 |
| | | | Tetrachloroethene | -- | -- | 1E-09 | 1E-09 | NV | -- | -- | 0.02 | 0.02 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.06 | 0.06 |
| | | | Trichloroethene | -- | -- | 6E-09 | 6E-09 | DV; IM | -- | -- | 0.1 | 0.1 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 0.7 | 0.7 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.06 | 0.06 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |

Table 9-12.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.08 | 0.08 |
| | | | Chemical Total | -- | -- | 9E-06 | 9E-06 | | -- | -- | 6 | 6 |
| | | Exposure Point Total | | | | | 9E-06 | | | | | 6 |
| | Exposure Medium Total | | | | | | 9E-06 | | | | | 6 |
| Medium Total | | | | | | | 9E-06 | | | | | 6 |
| Notes: | | | | | | Receptor Risk Total | 1E-05 | | | | Receptor Hazard Index (HI) | 7 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.007 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.3 |
| Total Endocrine (EN) HI across All Media = | 0.001 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 1 |
| Total Hepatic (HP) HI across All Media = | 0.07 |
| Total Immune (IM) HI across All Media = | 0.1 |
| Total Musculoskeletal (MS) HI across All Media = | 0.02 |
| Total Nervous (NV) HI across All Media = | 4 |
| Total Other (OT) HI across All Media = | 0.8 |
| Total Reproductive (RP) HI across All Media = | 0.007 |
| Total Respiratory (RS) HI across All Media = | 5 |
| Total Urinary (UR) HI across All Media = | 0.06 |

Table 9-13.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.03 | 0.001 | -- | 0.03 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.07 | 0.003 | -- | 0.07 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.002 | 0.000001 | -- | 0.002 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.0003 | 0.00001 | -- | 0.0003 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.0006 | 0.00003 | -- | 0.0006 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0004 | 0.00002 | -- | 0.0004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.3 | 0.06 | -- | 0.4 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.01 | 0.002 | -- | 0.02 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.1 | 0.007 | -- | 0.1 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.06 | 0.001 | -- | 0.06 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.8 | 0.08 | -- | 0.9 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.07 | 0.006 | -- | 0.08 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.08 | 0.005 | -- | 0.08 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.07 | 0.04 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.08 | 0.001 | -- | 0.09 |
| | | | Copper | -- | -- | -- | -- | GI | 0.3 | 0.004 | -- | 0.3 |
| | | | Iron | -- | -- | -- | -- | GI | 0.3 | 0.005 | -- | 0.3 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.09 | 0.04 | -- | 0.1 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.02 | 0.004 | -- | 0.02 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.1 | 0.04 | -- | 0.1 |
| | | | Silver | -- | -- | -- | -- | DM | 0.02 | 0.006 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.03 | 0.0005 | -- | 0.03 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.02 | 0.01 | -- | 0.03 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.02 | 0.0004 | -- | 0.02 |
| | | | Chemical Total | -- | -- | -- | -- | | 3 | 0.3 | -- | 3 |
| | | Exposure Point Total | | | | | -- | | | | | 3 |
| | Exposure Medium Total | | | | | | -- | | | | | 3 |

Table 9-13.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.000000004 | 0.000000004 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 6E-10 | 6E-10 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.00000007 | 0.00000007 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.0008 | 0.0008 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00005 | 0.00005 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0005 | 0.0005 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0008 | 0.0008 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-13.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 1 | 1 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.0009 | 0.0009 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.00008 | 0.00008 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.001 | 0.001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 1 | 1 |
| | | Exposure Point Total | | | | | -- | | | | | 1.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | -- | | | | | 4 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.003 | 0.0005 | -- | 0.004 |
| | | | Benzene | -- | -- | -- | -- | IM | 1 | 0.4 | -- | 1 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.001 | 0.0002 | -- | 0.001 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.05 | 0.02 | -- | 0.07 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.05 | 0.08 | -- | 0.1 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.005 | 0.02 | -- | 0.02 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.04 | 0.07 | -- | 0.1 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.009 | 0.02 | -- | 0.03 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.2 | 0.2 | -- | 0.4 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.02 | 0.01 | -- | 0.04 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.08 | 0.1 | -- | 0.2 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00004 | 0.0002 | -- | 0.0002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.06 | 0.2 | -- | 0.3 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.006 | -- | -- | 0.006 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.006 | 0.03 | -- | 0.04 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.4 | -- | -- | 0.4 |

Table 9-13.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.1 | 0.002 | -- | 0.1 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.03 | 0.003 | -- | 0.04 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.4 | 0.004 | -- | 0.4 |
| | | | Barium | -- | -- | -- | -- | NV | 0.004 | 0.0006 | -- | 0.004 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.04 | 0.07 | -- | 0.1 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.02 | 0.004 | -- | 0.02 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.06 | 0.05 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.3 | 0.002 | -- | 0.3 |
| | | | Iron | -- | -- | -- | -- | GI | 0.3 | 0.003 | -- | 0.3 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.4 | 0.1 | -- | 0.5 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.01 | 0.002 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 2 | 0.02 | -- | 2 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.03 | 0.01 | -- | 0.04 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.005 | 0.00003 | -- | 0.005 |
| | | | Chemical Total | -- | -- | -- | -- | | 5 | 1 | -- | 7 |
| | | Exposure Point Total | | | | | -- | | | | | 7 |
| | Exposure Medium Total | | | | | | -- | | | | | 7 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |

Table 9-13.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Medium Total | | | | | | | -- | | | | | 38 |
| | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 42 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.4 |
| Total Dermal (DM) HI across All Media = | 2 |
| Total Developmental (DV) HI across All Media = | 2 |
| Total Endocrine (EN) HI across All Media = | 0.5 |
| Total Gastrointestinal (GI) HI across All Media = | 1 |
| Total Hematological (HM) HI across All Media = | 0.9 |
| Total Hepatic (HP) HI across All Media = | 0.3 |
| Total Immune (IM) HI across All Media = | 17 |
| Total Nervous (NV) HI across All Media = | 15 |
| Total Other (OT) HI across All Media = | 1 |
| Total Reproductive (RP) HI across All Media = | 0.5 |
| Total Respiratory (RS) HI across All Media = | 2 |
| Total Urinary (UR) HI across All Media = | 0.9 |

Table 9-14.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.003 | 0.0002 | -- | 0.003 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.006 | 0.0004 | -- | 0.007 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.0001 | 0.0000001 | -- | 0.0001 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.00003 | 0.000002 | -- | 0.00003 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.00005 | 0.000003 | -- | 0.00006 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00003 | 0.000002 | -- | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.03 | 0.007 | -- | 0.03 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.001 | 0.0003 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.01 | 0.0008 | -- | 0.01 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.006 | 0.0001 | -- | 0.006 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.07 | 0.01 | -- | 0.08 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.007 | 0.0007 | -- | 0.008 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.007 | 0.0006 | -- | 0.008 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.006 | 0.005 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.008 | 0.0002 | -- | 0.008 |
| | | | Copper | -- | -- | -- | -- | GI | 0.03 | 0.0005 | -- | 0.03 |
| | | | Iron | -- | -- | -- | -- | GI | 0.03 | 0.0006 | -- | 0.03 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.008 | 0.004 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.002 | 0.0005 | -- | 0.002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.009 | 0.005 | -- | 0.01 |
| | | | Silver | -- | -- | -- | -- | DM | 0.001 | 0.0007 | -- | 0.002 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.003 | 0.00006 | -- | 0.003 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.002 | 0.001 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.002 | 0.00005 | -- | 0.002 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.2 | 0.04 | -- | 0.3 |
| | | Exposure Point Total | | | | | -- | | | | | 0.3 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.3 |

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Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.00001 | 0.00001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.000000004 | 0.000000004 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 6E-10 | 6E-10 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.00000007 | 0.00000007 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.0008 | 0.0008 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00005 | 0.00005 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.0001 | 0.0001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0005 | 0.0005 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0008 | 0.0008 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.003 | 0.003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.003 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-14.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 1 | 1 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.0009 | 0.0009 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.00008 | 0.00008 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.001 | 0.001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 1 | 1 |
| | | Exposure Point Total | | | | | -- | | | | | 1.000 |
| | Exposure Medium Total | | | | | | -- | | | | | 1 |
| Medium Total | | | | | | | -- | | | | | 1 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.006 | 0.0002 | -- | 0.006 |
| | | | Benzene | -- | -- | -- | -- | IM | 2 | 0.2 | -- | 2 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.002 | 0.0001 | -- | 0.002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.1 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.09 | 0.04 | -- | 0.1 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.008 | 0.008 | -- | 0.02 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.07 | 0.04 | -- | 0.1 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.02 | 0.008 | -- | 0.03 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.3 | 0.09 | -- | 0.4 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.04 | 0.006 | -- | 0.05 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.1 | 0.07 | -- | 0.2 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00007 | 0.00008 | -- | 0.0002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.1 | 0.1 | -- | 0.2 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.01 | -- | -- | 0.01 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.01 | 0.02 | -- | 0.03 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.7 | -- | -- | 0.7 |

Table 9-14.CTE
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.2 | 0.0007 | -- | 0.2 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.06 | 0.001 | -- | 0.06 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.6 | 0.002 | -- | 0.6 |
| | | | Barium | -- | -- | -- | -- | NV | 0.006 | 0.0003 | -- | 0.007 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.07 | 0.03 | -- | 0.1 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.03 | 0.002 | -- | 0.03 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.1 | 0.03 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.6 | 0.0007 | -- | 0.6 |
| | | | Iron | -- | -- | -- | -- | GI | 0.5 | 0.002 | -- | 0.5 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.7 | 0.06 | -- | 0.8 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.02 | 0.0009 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 3 | 0.01 | -- | 3 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.05 | 0.006 | -- | 0.06 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.008 | 0.00002 | -- | 0.008 |
| | | | Chemical Total | -- | -- | -- | -- | | 10 | 0.8 | -- | 10 |
| | | Exposure Point Total | | | | | -- | | | | | 10 |
| | Exposure Medium Total | | | | | | -- | | | | | 10 |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.00009 | 0.00009 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.005 | 0.005 |
| | | | Chloroform | -- | -- | -- | -- | HP | -- | -- | 0.000003 | 0.000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.0002 | 0.0002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.00004 | 0.00004 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.006 | 0.006 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.0002 | 0.0002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.006 | 0.006 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.0009 | 0.0009 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.002 | 0.002 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |

Table 9-14.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00003 | 0.00003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.02 | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 42 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 43 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.7 |
| Total Dermal (DM) HI across All Media = | 4 |
| Total Developmental (DV) HI across All Media = | 2 |
| Total Endocrine (EN) HI across All Media = | 0.7 |
| Total Gastrointestinal (GI) HI across All Media = | 0.7 |
| Total Hematological (HM) HI across All Media = | 0.2 |
| Total Hepatic (HP) HI across All Media = | 0.3 |
| Total Immune (IM) HI across All Media = | 18 |
| Total Nervous (NV) HI across All Media = | 15 |
| Total Other (OT) HI across All Media = | 0.5 |

Table 9-14.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.7 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 2 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.9 |

Table 9-15.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 6E-07 | 3E-08 | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | 3E-08 | 3E-11 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 3E-08 | 2E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Naphthalene | 1E-07 | 6E-09 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 1E-06 | 3E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 5E-05 | 1E-05 | -- | 5E-05 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 1E-06 | 3E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 8E-07 | 2E-07 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 9E-07 | 2E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 9E-09 | 1E-09 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-06 | 6E-08 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 3E-06 | 3E-07 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 5E-05 | 3E-05 | -- | 9E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 1E-04 | 4E-05 | -- | 2E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-04 | | | | | -- |

Table 9-15.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 6E-12 | 6E-12 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 2E-13 | 2E-13 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-13 | 3E-13 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 1E-13 | 1E-13 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 5E-08 | 5E-08 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 8E-10 | 8E-10 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 5E-08 | 5E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 5E-08 | | | | | -- |
| | | Vapors above Site | | | | | | | | | | |

Table 9-15.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 7E-07 | 7E-07 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 8E-07 | 8E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 8E-07 | | | | | -- |
| | Exposure Medium Total | | | | | | 9E-07 | | | | | -- |
| Medium Total | | | | | | | 2E-04 | | | | | -- |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 1E-06 | 3E-08 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | 1E-04 | 1E-05 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Chloroform | 2E-07 | 1E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 3E-05 | 1E-05 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | 5E-05 | 2E-05 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | 7E-08 | 3E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | 8E-07 | 9E-08 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 9E-08 | 9E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 6E-07 | -- | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 5E-06 | -- | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 5E-07 | -- | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 2E-05 | -- | -- | 2E-05 | -- | -- | -- | -- | -- |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 1E-04 | 2E-07 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Barium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Beryllium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cadmium (Water) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-04 | 6E-05 | -- | 3E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 6E-04 | 1E-04 | -- | 7E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Chloroform | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 6E-08 | 6E-08 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 4E-11 | 4E-11 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |

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Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-09 | 5E-09 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 4E-07 | 4E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 4E-07 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 4E-06 | 4E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 7E-04 | 7E-04 | -- | -- | -- | -- | -- |
| | | | Cyclohexane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-04 | 2E-04 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 1E-05 | 1E-05 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 2E-06 | 2E-06 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 9E-04 | 9E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 9E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | 2E-03 | | | | | -- |
| | | | | | | Receptor Risk Total | 2E-03 | | | | Receptor Hazard Index (HI) | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-16.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.005 | 0.00007 | -- | 0.005 |
| | | | Arsenic | 9E-08 | 6E-09 | -- | 1E-07 | CV; DM | 0.002 | 0.0002 | -- | 0.002 |
| | | | Chromium, Total | 2E-07 | 1E-07 | -- | 3E-07 | NA | 0.002 | 0.0009 | -- | 0.002 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.005 | 0.00007 | -- | 0.005 |
| | | | Iron | -- | -- | -- | -- | GI | 0.005 | 0.00008 | -- | 0.005 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.005 | 0.00007 | -- | 0.005 |
| | | | Chemical Total | 3E-07 | 1E-07 | -- | 4E-07 | | 0.02 | 0.001 | -- | 0.02 |
| | | Exposure Point Total | | | | | 4E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 4E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Arsenic | -- | -- | 9E-11 | 9E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | 1E-09 | 1E-09 | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cobalt | -- | -- | 2E-10 | 2E-10 | RS | -- | -- | 0.00005 | 0.00005 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-09 | 1E-09 | | -- | -- | 0.0004 | 0.0004 |
| | | Exposure Point Total | | | | | 1E-09 | | | | | 0.0004 |
| | Exposure Medium Total | | | | | | 1E-09 | | | | | 0.0004 |
| Medium Total | | | | | | | 4E-07 | | | | | 0.03 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 5E-12 | 5E-12 | NV | -- | -- | 0.0000003 | 0.0000003 |
| | | | Benzene | -- | -- | 6E-10 | 6E-10 | IM | -- | -- | 0.00003 | 0.00003 |
| | | | Chloroform | -- | -- | 3E-12 | 3E-12 | HP | -- | -- | 0.00000002 | 0.00000002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-10 | 2E-10 | DV | -- | -- | 0.0000008 | 0.0000008 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000002 | 0.0000002 |
| | | | Naphthalene | -- | -- | 1E-10 | 1E-10 | NV; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Tetrachloroethene | -- | -- | 4E-13 | 4E-13 | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Trichloroethene | -- | -- | 1E-12 | 1E-12 | DV; IM | -- | -- | 0.000001 | 0.000001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |

Table 9-16.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000001 | 0.000001 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Benzo(a)anthracene | -- | -- | 3E-15 | 3E-15 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-12 | 4E-12 | -- | -- | -- | 0.00000003 | 0.00000003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Chemical Total | -- | -- | 9E-10 | 9E-10 | | -- | -- | 0.00007 | 0.00007 |
| | | Exposure Point Total | | | | | 9E-10 | | | | | 0.00007 |
| | Exposure Medium Total | | | | | | 9E-10 | | | | | 0.00007 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 2E-07 | 2E-07 | NV | -- | -- | 0.01 | 0.01 |
| | | | Benzene | -- | -- | 4E-05 | 4E-05 | IM | -- | -- | 2 | 2 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.06 | 0.06 |
| | | | Ethylbenzene | -- | -- | 1E-05 | 1E-05 | DV | -- | -- | 0.05 | 0.05 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.01 | 0.01 |
| | | | Naphthalene | -- | -- | 8E-07 | 8E-07 | NV; RS | -- | -- | 0.08 | 0.08 |
| | | | Tetrachloroethene | -- | -- | 3E-08 | 3E-08 | NV | -- | -- | 0.03 | 0.03 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.06 | 0.06 |
| | | | Trichloroethene | -- | -- | 6E-08 | 6E-08 | DV; IM | -- | -- | 0.08 | 0.08 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 1 | 1 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.02 | 0.02 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.04 | 0.04 |
| | | | Chemical Total | -- | -- | 5E-05 | 5E-05 | | -- | -- | 4 | 4 |
| | | Exposure Point Total | | | | | 5E-05 | | | | | 4 |
| | Exposure Medium Total | | | | | | 5E-05 | | | | | 4 |
| Medium Total | | | | | | | 5E-05 | | | | | 4 |
| Notes: | | | | | | Receptor Risk Total | 5E-05 | | | | Receptor Hazard Index (HI) | 4 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.007 |
| Total Developmental (DV) HI across All Media = | 0.2 |

Table 9-16.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Endocrine (EN) HI across All Media = | | | 0.02 |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 0.005 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.02 |
| | | | | | | | | | Total Immune (IM) HI across All Media = | | | 2 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 2 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.00001 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.08 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.02 |

Table 9-17.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.005 | 0.0002 | -- | 0.005 |
| | | | Arsenic | 7E-09 | 1E-09 | -- | 8E-09 | DM | 0.0001 | 0.00002 | -- | 0.0002 |
| | | | Chromium, Total | 2E-08 | 2E-08 | -- | 4E-08 | HM | 0.0009 | 0.001 | -- | 0.002 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0005 | 0.00002 | -- | 0.0005 |
| | | | Iron | -- | -- | -- | -- | GI | 0.005 | 0.0002 | -- | 0.006 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.00004 | -- | 0.001 |
| | | | Chemical Total | 2E-08 | 2E-08 | -- | 5E-08 | | 0.01 | 0.002 | -- | 0.01 |
| | | Exposure Point Total | | | | | 5E-08 | | | | | 0.01 |
| | Exposure Medium Total | | | | | | 5E-08 | | | | | 0.01 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.02 | 0.02 |
| | | | Arsenic | -- | -- | 8E-10 | 8E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.002 | 0.002 |
| | | | Chromium, Total | -- | -- | 1E-08 | 1E-08 | RS | -- | -- | 0.0004 | 0.0004 |
| | | | Cobalt | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.002 | 0.002 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-08 | 1E-08 | | -- | -- | 0.03 | 0.03 |
| | | Exposure Point Total | | | | | 1E-08 | | | | | 0.03 |
| | Exposure Medium Total | | | | | | 1E-08 | | | | | 0.03 |
| Medium Total | | | | | | | 6E-08 | | | | | 0.04 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 4E-11 | 8E-11 | -- | 1E-10 | UR | 0.000003 | 0.000007 | -- | 0.00001 |
| | | | Benzene | 5E-09 | 3E-08 | -- | 4E-08 | HM | 0.001 | 0.008 | -- | 0.009 |
| | | | Chloroform | 7E-12 | 2E-11 | -- | 3E-11 | HP | 0.0000003 | 0.000001 | -- | 0.000001 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.00002 | 0.00009 | -- | 0.0001 |
| | | | Ethylbenzene | 1E-09 | 3E-08 | -- | 3E-08 | HP | 0.0003 | 0.007 | -- | 0.007 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.000004 | 0.0002 | -- | 0.0002 |
| | | | Naphthalene | 2E-09 | 5E-08 | -- | 5E-08 | NV | 0.000004 | 0.0001 | -- | 0.0001 |
| | | | Tetrachloroethene | 3E-12 | 6E-11 | -- | 6E-11 | NV | 0.00002 | 0.0005 | -- | 0.0005 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.00006 | 0.0008 | -- | 0.0009 |
| | | | Trichloroethene | 1E-11 | 8E-11 | -- | 1E-10 | DV; IM | 0.00008 | 0.0005 | -- | 0.0006 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.0001 | 0.003 | -- | 0.003 |

Table 9-17.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 4E-12 | 2E-10 | -- | 2E-10 | DV | 0.0000006 | 0.00003 | -- | 0.00004 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.0002 | 0.009 | -- | 0.01 |
| | | | Benzo(a)anthracene | 5E-12 | -- | -- | 5E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 4E-11 | -- | -- | 4E-11 | DV | 0.00002 | -- | -- | 0.00002 |
| | | | Benzo(b)fluoranthene | 4E-12 | -- | -- | 4E-12 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.000005 | 0.0003 | -- | 0.0003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 9E-10 | -- | -- | 9E-10 | IM | 0.00005 | -- | -- | 0.00005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.0004 | 0.0001 | -- | 0.0006 |
| | | | Antimony | -- | -- | -- | -- | OT | 0.0001 | 0.0003 | -- | 0.0004 |
| | | | Arsenic | 4E-09 | 1E-09 | -- | 5E-09 | DM | 0.00007 | 0.00002 | -- | 0.0001 |
| | | | Barium | -- | -- | -- | -- | UR | 0.00001 | 0.00006 | -- | 0.00007 |
| | | | Beryllium | -- | -- | -- | -- | -- | 0.00005 | 0.002 | -- | 0.002 |
| | | | Cadmium (Water) | -- | -- | -- | -- | MS | 0.00006 | 0.0004 | -- | 0.0005 |
| | | | Chromium, Total | 2E-09 | 5E-08 | -- | 6E-08 | HM | 0.0001 | 0.003 | -- | 0.003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0001 | 0.00001 | -- | 0.0001 |
| | | | Iron | -- | -- | -- | -- | GI | 0.0009 | 0.0003 | -- | 0.001 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.001 | 0.01 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.0005 | -- | 0.002 |
| | | | Vanadium | -- | -- | -- | -- | HM | 0.00005 | 0.0006 | -- | 0.0007 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.00002 | 0.000003 | -- | 0.00002 |
| | | | Chemical Total | 2E-08 | 2E-07 | -- | 2E-07 | | 0.007 | 0.05 | -- | 0.06 |
| | | Exposure Point Total | | | | | 2E-07 | | | | | 0.06 |
| | Exposure Medium Total | | | | | | 2E-07 | | | | | 0.06 |
| | Outdoor Air | Trench (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 7E-08 | 7E-08 | NV | -- | -- | 0.005 | 0.005 |
| | | | Benzene | -- | -- | 4E-06 | 4E-06 | HM | -- | -- | 1 | 1 |
| | | | Chloroform | -- | -- | 3E-08 | 3E-08 | HP | -- | -- | 0.0007 | 0.0007 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-06 | 2E-06 | OT | -- | -- | 0.009 | 0.009 |
| | | | Isopropylbenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.09 | 0.09 |
| | | | Naphthalene | -- | -- | 3E-06 | 3E-06 | NV; RS | -- | -- | 4 | 4 |
| | | | Tetrachloroethene | -- | -- | 1E-09 | 1E-09 | NV | -- | -- | 0.02 | 0.02 |

Table 9-17.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
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Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.06 | 0.06 |
| | | | Trichloroethene | -- | -- | 6E-09 | 6E-09 | DV; IM | -- | -- | 0.1 | 0.1 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | -- | -- | 0.7 | 0.7 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.06 | 0.06 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.08 | 0.08 |
| | | | Chemical Total | -- | -- | 9E-06 | 9E-06 | | -- | -- | 6 | 6 |
| | | Exposure Point Total | | | | | 9E-06 | | | | | 6 |
| | Exposure Medium Total | | | | | | 9E-06 | | | | | 6 |
| Medium Total | | | | | | | 9E-06 | | | | | 6 |
| Notes: | | | | | | Receptor Risk Total | 9E-06 | | | | Receptor Hazard Index (HI) | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.005 |
| Total Developmental (DV) HI across All Media = | 0.1 |
| Total Endocrine (EN) HI across All Media = | 0.0006 |
| Total Gastrointestinal (GI) HI across All Media = | 0.007 |
| Total Hematological (HM) HI across All Media = | 1 |
| Total Hepatic (HP) HI across All Media = | 0.07 |
| Total Immune (IM) HI across All Media = | 0.1 |
| Total Musculoskeletal (MS) HI across All Media = | 0.0005 |
| Total Nervous (NV) HI across All Media = | 4 |
| Total Other (OT) HI across All Media = | 0.7 |
| Total Reproductive (RP) HI across All Media = | 0.002 |
| Total Respiratory (RS) HI across All Media = | 4 |
| Total Urinary (UR) HI across All Media = | 0.06 |

Table 9-18.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.04 | 0.0007 | -- | 0.04 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.02 | 0.002 | -- | 0.02 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.01 | 0.009 | -- | 0.02 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.04 | 0.0007 | -- | 0.04 |
| | | | Iron | -- | -- | -- | -- | GI | 0.05 | 0.0008 | -- | 0.05 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.04 | 0.0007 | -- | 0.04 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.2 | 0.01 | -- | 0.2 |
| | | Exposure Point Total | | | | | -- | | | | | 0.2 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.2 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | -- | | | | | 0.2 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.003 | 0.0005 | -- | 0.004 |
| | | | Benzene | -- | -- | -- | -- | IM | 1 | 0.4 | -- | 1 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.001 | 0.0002 | -- | 0.001 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.05 | 0.02 | -- | 0.07 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.05 | 0.08 | -- | 0.1 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.005 | 0.02 | -- | 0.02 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.04 | 0.07 | -- | 0.1 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.009 | 0.02 | -- | 0.03 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.2 | 0.2 | -- | 0.4 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.02 | 0.01 | -- | 0.04 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.08 | 0.1 | -- | 0.2 |

Table 9-18.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00004 | 0.0002 | -- | 0.0002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.06 | 0.2 | -- | 0.3 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.006 | -- | -- | 0.006 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.006 | 0.03 | -- | 0.04 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.4 | -- | -- | 0.4 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.1 | 0.002 | -- | 0.1 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.03 | 0.003 | -- | 0.04 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.4 | 0.004 | -- | 0.4 |
| | | | Barium | -- | -- | -- | -- | NV | 0.004 | 0.0006 | -- | 0.004 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.04 | 0.07 | -- | 0.1 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.02 | 0.004 | -- | 0.02 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.06 | 0.05 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.3 | 0.002 | -- | 0.3 |
| | | | Iron | -- | -- | -- | -- | GI | 0.3 | 0.003 | -- | 0.3 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.4 | 0.1 | -- | 0.5 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.01 | 0.002 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 2 | 0.02 | -- | 2 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.03 | 0.01 | -- | 0.04 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.005 | 0.00003 | -- | 0.005 |
| | | | Chemical Total | -- | -- | -- | -- | | 5 | 1 | -- | 7 |
| | | Exposure Point Total | | | | | -- | | | | | 7 |
| | Exposure Medium Total | | | | | | -- | | | | | 7 |
| | Indoor Air | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |

Table 9-18.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 38 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 38 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.4 |
| Total Dermal (DM) HI across All Media = | 2 |
| Total Developmental (DV) HI across All Media = | 2 |
| Total Endocrine (EN) HI across All Media = | 0.5 |
| Total Gastrointestinal (GI) HI across All Media = | 0.4 |
| Total Hematological (HM) HI across All Media = | 0.04 |
| Total Hepatic (HP) HI across All Media = | 0.3 |
| Total Immune (IM) HI across All Media = | 17 |
| Total Nervous (NV) HI across All Media = | 15 |
| Total Other (OT) HI across All Media = | 0.4 |
| Total Reproductive (RP) HI across All Media = | 0.4 |
| Total Respiratory (RS) HI across All Media = | 1 |
| Total Urinary (UR) HI across All Media = | 0.8 |

Table 9-19.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.004 | 0.00008 | -- | 0.004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.002 | 0.0002 | -- | 0.002 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.001 | 0.001 | -- | 0.002 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.004 | 0.00008 | -- | 0.004 |
| | | | Iron | -- | -- | -- | -- | GI | 0.004 | 0.00009 | -- | 0.005 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.004 | 0.00008 | -- | 0.004 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.02 | 0.002 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0003 | 0.0003 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0003 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.0003 |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.006 | 0.0002 | -- | 0.006 |
| | | | Benzene | -- | -- | -- | -- | IM | 2 | 0.2 | -- | 2 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.002 | 0.0001 | -- | 0.002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.1 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.09 | 0.04 | -- | 0.1 |
| | | | Isopropylbenzene | -- | -- | -- | -- | UR | 0.008 | 0.008 | -- | 0.02 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.07 | 0.04 | -- | 0.1 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | 0.02 | 0.008 | -- | 0.03 |
| | | | Toluene | -- | -- | -- | -- | UR | 0.3 | 0.09 | -- | 0.4 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.04 | 0.006 | -- | 0.05 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.1 | 0.07 | -- | 0.2 |

Table 9-19.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
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Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00007 | 0.00008 | -- | 0.0002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | RS | 0.1 | 0.1 | -- | 0.2 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.01 | -- | -- | 0.01 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | OT | 0.01 | 0.02 | -- | 0.03 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.7 | -- | -- | 0.7 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.2 | 0.0007 | -- | 0.2 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.06 | 0.001 | -- | 0.06 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.6 | 0.002 | -- | 0.6 |
| | | | Barium | -- | -- | -- | -- | NV | 0.006 | 0.0003 | -- | 0.007 |
| | | | Beryllium | -- | -- | -- | -- | GI | 0.07 | 0.03 | -- | 0.1 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.03 | 0.002 | -- | 0.03 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.1 | 0.03 | -- | 0.1 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.6 | 0.0007 | -- | 0.6 |
| | | | Iron | -- | -- | -- | -- | GI | 0.5 | 0.002 | -- | 0.5 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.7 | 0.06 | -- | 0.8 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.02 | 0.0009 | -- | 0.02 |
| | | | Thallium | -- | -- | -- | -- | DM | 3 | 0.01 | -- | 3 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.05 | 0.006 | -- | 0.06 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.008 | 0.00002 | -- | 0.008 |
| | | | Chemical Total | -- | -- | -- | -- | | 10 | 0.8 | -- | 10 |
| | | Exposure Point Total | | | | | -- | | | | | 10 |
| | Exposure Medium Total | | | | | | -- | | | | | 10 |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.00009 | 0.00009 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.005 | 0.005 |
| | | | Chloroform | -- | -- | -- | -- | HP | -- | -- | 0.000003 | 0.000003 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.0002 | 0.0002 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.00004 | 0.00004 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.006 | 0.006 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.0002 | 0.0002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.006 | 0.006 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.0009 | 0.0009 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.002 | 0.002 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00003 | 0.00003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0001 | 0.0001 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.02 | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.1 | 0.1 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 15 | 15 |
| | | | Cyclohexane | -- | -- | -- | -- | DV | -- | -- | 0.5 | 0.5 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.4 | 0.4 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.1 | 0.1 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.7 | 0.7 |
| | | | Tetrachloroethene | -- | -- | -- | -- | NV | -- | -- | 0.2 | 0.2 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.5 | 0.5 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.7 | 0.7 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 12 | 12 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.2 | 0.2 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.3 | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 31 | 31 |
| | | Exposure Point Total | | | | | -- | | | | | 31 |
| | Exposure Medium Total | | | | | | -- | | | | | 31 |
| Medium Total | | | | | | | -- | | | | | 42 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 42 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.6 |

Table 9-19.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Dermal (DM) HI across All Media = | | | 4 |
| | | | | | | | | | Total Developmental (DV) HI across All Media = | | | 2 |
| | | | | | | | | | Total Endocrine (EN) HI across All Media = | | | 0.7 |
| | | | | | | | | | Total Gastrointestinal (GI) HI across All Media = | | | 0.6 |
| | | | | | | | | | Total Hematological (HM) HI across All Media = | | | 0.07 |
| | | | | | | | | | Total Hepatic (HP) HI across All Media = | | | 0.3 |
| | | | | | | | | | Total Immune (IM) HI across All Media = | | | 18 |
| | | | | | | | | | Total Nervous (NV) HI across All Media = | | | 15 |
| | | | | | | | | | Total Other (OT) HI across All Media = | | | 0.4 |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.7 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.9 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.9 |

Table 9-20.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 8E-07 | 7E-08 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 1E-05 | 7E-06 | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 1E-05 | 7E-06 | -- | 2E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 2E-05 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 4E-10 | 4E-10 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-08 | 1E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-08 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-08 | | | | | -- |
| Medium Total | | | | | | | 2E-05 | | | | | -- |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | 1E-06 | 3E-08 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | 1E-04 | 1E-05 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Chloroform | 2E-07 | 1E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 3E-05 | 1E-05 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | 5E-05 | 2E-05 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | 7E-08 | 3E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | 8E-07 | 9E-08 | -- | 9E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-20.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 9E-08 | 9E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 6E-07 | -- | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 5E-06 | -- | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 5E-07 | -- | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 2E-05 | -- | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 1E-04 | 2E-07 | -- | 1E-04 | -- | -- | -- | -- | -- |
| | | | Barium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Beryllium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cadmium (Water) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 2E-04 | 6E-05 | -- | 3E-04 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 6E-04 | 1E-04 | -- | 7E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Chloroform | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 6E-08 | 6E-08 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 4E-11 | 4E-11 | -- | -- | -- | -- | -- |

Table 9-20.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-09 | 5E-09 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 4E-07 | 4E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 4E-07 | | | | | -- |
| | | Indoor Air (Vapor Intrusion) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 4E-06 | 4E-06 | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 7E-04 | 7E-04 | -- | -- | -- | -- | -- |
| | | | Cyclohexane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 2E-04 | 2E-04 | -- | -- | -- | -- | -- |
| | | | Isopropylbenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 1E-05 | 1E-05 | -- | -- | -- | -- | -- |
| | | | Tetrachloroethene | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Toluene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 2E-06 | 2E-06 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 9E-04 | 9E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 9E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | 2E-03 | | | | | -- |
| | | | | | | Receptor Risk Total | 2E-03 | | | | Receptor Hazard Index (HI) | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-21.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 5E-08 | 4E-09 | -- | 6E-08 | HM; IM | 0.002 | 0.0002 | -- | 0.003 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.006 | 0.0005 | -- | 0.006 |
| | | | Benzene | 3E-09 | 4E-12 | -- | 3E-09 | IM | 0.0001 | 0.0000002 | -- | 0.0001 |
| | | | Ethylbenzene | 3E-09 | 2E-10 | -- | 3E-09 | HP; UR | 0.00003 | 0.000002 | -- | 0.00003 |
| | | | Naphthalene | 1E-08 | 1E-09 | -- | 1E-08 | OT | 0.00005 | 0.000004 | -- | 0.00005 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00003 | 0.000003 | -- | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 2E-08 | 8E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 8E-07 | 3E-07 | -- | 1E-06 | DV | 0.03 | 0.01 | -- | 0.04 |
| | | | Benzo(b)fluoranthene | 2E-08 | 8E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-08 | 5E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 2E-08 | 6E-09 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 8E-10 | 2E-10 | -- | 1E-09 | HP | 0.001 | 0.0003 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 1E-07 | 9E-09 | -- | 1E-07 | RP | 0.01 | 0.001 | -- | 0.01 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.006 | 0.0002 | -- | 0.006 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.07 | 0.01 | -- | 0.08 |
| | | | Arsenic | 3E-07 | 4E-08 | -- | 3E-07 | CV; DM | 0.007 | 0.0009 | -- | 0.008 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.007 | 0.0008 | -- | 0.008 |
| | | | Chromium, Total | 9E-07 | 1E-06 | -- | 2E-06 | NA | 0.006 | 0.007 | -- | 0.01 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.007 | 0.0002 | -- | 0.008 |
| | | | Copper | -- | -- | -- | -- | GI | 0.02 | 0.0007 | -- | 0.03 |
| | | | Iron | -- | -- | -- | -- | GI | 0.03 | 0.0008 | -- | 0.03 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.008 | 0.006 | -- | 0.01 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.002 | 0.0007 | -- | 0.002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.009 | 0.006 | -- | 0.01 |
| | | | Silver | -- | -- | -- | -- | DM | 0.001 | 0.001 | -- | 0.002 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.003 | 0.00008 | -- | 0.003 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.001 | 0.002 | -- | 0.003 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.002 | 0.00006 | -- | 0.002 |
| | | | Chemical Total | 2E-06 | 1E-06 | -- | 4E-06 | | 0.2 | 0.05 | -- | 0.3 |
| | | Exposure Point Total | | | | | 4E-06 | | | | | 0.3 |
| | Exposure Medium Total | | | | | | 4E-06 | | | | | 0.3 |

Table 9-21.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 6E-12 | 6E-12 | RS | -- | -- | 0.00002 | 0.00002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Benzene | -- | -- | 2E-13 | 2E-13 | IM | -- | -- | 0.000000007 | 0.000000007 |
| | | | Ethylbenzene | -- | -- | 3E-13 | 3E-13 | DV | -- | -- | 0.000000001 | 0.000000001 |
| | | | Naphthalene | -- | -- | 1E-12 | 1E-12 | NV; RS | -- | -- | 0.0000001 | 0.0000001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00000003 | 0.00000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 2E-10 | 2E-10 | DV | -- | -- | 0.002 | 0.002 |
| | | | Benzo(b)fluoranthene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 4E-12 | 4E-12 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 9E-14 | 9E-14 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | 0.00000009 | 0.00000009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0004 | 0.0004 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Arsenic | -- | -- | 5E-10 | 5E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00009 | 0.00009 |
| | | | Cadmium (Diet) | -- | -- | 5E-10 | 5E-10 | UR | -- | -- | 0.0003 | 0.0003 |
| | | | Chromium, Total | -- | -- | 8E-09 | 8E-09 | RS | -- | -- | 0.0009 | 0.0009 |
| | | | Cobalt | -- | -- | 8E-10 | 8E-10 | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.002 | 0.002 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000004 | 0.0000004 |
| | | | Nickel | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.0007 | 0.0007 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-08 | 1E-08 | | -- | -- | 0.006 | 0.006 |
| | | Exposure Point Total | | | | | 1E-08 | | | | | 0.006 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-21.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 7E-07 | 7E-07 | RS | -- | -- | 2 | 2 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.02 | 0.02 |
| | | | Benzene | -- | -- | 4E-08 | 4E-08 | IM | -- | -- | 0.002 | 0.002 |
| | | | Ethylbenzene | -- | -- | 4E-08 | 4E-08 | DV | -- | -- | 0.0001 | 0.0001 |
| | | | Naphthalene | -- | -- | 2E-08 | 2E-08 | NV; RS | -- | -- | 0.002 | 0.002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 4E-10 | 4E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | 0.00002 | 0.00002 |
| | | | Chemical Total | -- | -- | 8E-07 | 8E-07 | | -- | -- | 2 | 2 |
| | | Exposure Point Total | | | | | 8E-07 | | | | | 2.000 |
| | Exposure Medium Total | | | | | | 8E-07 | | | | | 2 |
| Medium Total | | | | | | | 4E-06 | | | | | 3 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 8E-12 | 8E-12 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 9E-10 | 9E-10 | IM | -- | -- | 0.00004 | 0.00004 |
| | | | Chloroform | -- | -- | 5E-12 | 5E-12 | HP | -- | -- | 0.00000002 | 0.00000002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-10 | 3E-10 | DV | -- | -- | 0.000001 | 0.000001 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000003 | 0.0000003 |
| | | | Naphthalene | -- | -- | 2E-10 | 2E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 6E-13 | 6E-13 | NV | -- | -- | 0.0000006 | 0.0000006 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Trichloroethene | -- | -- | 2E-12 | 2E-12 | DV; IM | -- | -- | 0.000002 | 0.000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 5E-15 | 5E-15 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-12 | 7E-12 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000008 | 0.0000008 |

Table 9-21.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chemical Total | -- | -- | 1E-09 | 1E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 1E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 1E-09 | | | | | 0.0001 |
| Notes: | | | | | | Receptor Risk Total | 4E-06 | | | | Receptor Hazard Index (HI) | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.008 |
| Total Dermal (DM) HI across All Media = | 0.02 |
| Total Developmental (DV) HI across All Media = | 0.04 |
| Total Endocrine (EN) HI across All Media = | 0.008 |
| Total Gastrointestinal (GI) HI across All Media = | 0.05 |
| Total Hematological (HM) HI across All Media = | 0.09 |
| Total Hepatic (HP) HI across All Media = | 0.002 |
| Total Immune (IM) HI across All Media = | 0.004 |
| Total Nervous (NV) HI across All Media = | 0.06 |
| Total Other (OT) HI across All Media = | 0.1 |
| Total Reproductive (RP) HI across All Media = | 0.01 |
| Total Respiratory (RS) HI across All Media = | 2 |
| Total Urinary (UR) HI across All Media = | 0.008 |

Table 9-22.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 2E-08 | 4E-08 | -- | 6E-08 | HM; IM | 0.0006 | 0.001 | -- | 0.002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.002 | 0.003 | -- | 0.004 |
| | | | Benzene | 1E-09 | 4E-11 | -- | 1E-09 | IM | 0.00004 | 0.000001 | -- | 0.00004 |
| | | | Ethylbenzene | 1E-09 | 2E-09 | -- | 3E-09 | HP; UR | 0.000007 | 0.00001 | -- | 0.00002 |
| | | | Naphthalene | 4E-09 | 8E-09 | -- | 1E-08 | OT | 0.00001 | 0.00002 | -- | 0.00004 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.000009 | 0.00002 | -- | 0.00002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 1E-08 | 7E-10 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 4E-07 | 2E-08 | -- | 5E-07 | DV | 0.007 | 0.06 | -- | 0.06 |
| | | | Benzo(b)fluoranthene | 1E-08 | 7E-10 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 7E-09 | 4E-10 | -- | 8E-09 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 9E-09 | 5E-10 | -- | 9E-09 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 3E-10 | 2E-09 | -- | 2E-09 | HP | 0.0003 | 0.002 | -- | 0.002 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 4E-08 | 8E-08 | -- | 1E-07 | RP | 0.003 | 0.006 | -- | 0.009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.001 | 0.0009 | -- | 0.002 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.02 | 0.08 | -- | 0.09 |
| | | | Arsenic | 1E-07 | 4E-07 | -- | 5E-07 | CV; DM | 0.002 | 0.005 | -- | 0.007 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.002 | 0.005 | -- | 0.006 |
| | | | Chromium, Total | 5E-07 | 9E-08 | -- | 6E-07 | NA | 0.002 | 0.04 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.002 | 0.001 | -- | 0.003 |
| | | | Copper | -- | -- | -- | -- | GI | 0.006 | 0.004 | -- | 0.01 |
| | | | Iron | -- | -- | -- | -- | GI | 0.007 | 0.005 | -- | 0.01 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.002 | 0.03 | -- | 0.03 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.0004 | 0.004 | -- | 0.004 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.002 | 0.04 | -- | 0.04 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0004 | 0.006 | -- | 0.006 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0008 | 0.0005 | -- | 0.001 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.0004 | 0.009 | -- | 0.009 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0006 | 0.0004 | -- | 0.0009 |
| | | | Chemical Total | 1E-06 | 6E-07 | -- | 2E-06 | | 0.06 | 0.3 | -- | 0.4 |
| | | Exposure Point Total | | | | | 2E-06 | | | | | 0.4 |
| | Exposure Medium Total | | | | | | 2E-06 | | | | | 0.4 |

Table 9-22.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-13 | 3E-13 | RS | -- | -- | 0.0000007 | 0.0000007 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Benzene | -- | -- | 9E-15 | 9E-15 | IM | -- | -- | 3E-10 | 3E-10 |
| | | | Ethylbenzene | -- | -- | 1E-14 | 1E-14 | DV | -- | -- | 4E-11 | 4E-11 |
| | | | Naphthalene | -- | -- | 7E-14 | 7E-14 | NV; RS | -- | -- | 0.000000005 | 0.000000005 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.000000001 | 0.000000001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 8E-13 | 8E-13 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 3E-11 | 3E-11 | DV | -- | -- | 0.00006 | 0.00006 |
| | | | Benzo(b)fluoranthene | -- | -- | 9E-13 | 9E-13 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 5E-13 | 5E-13 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 6E-13 | 6E-13 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 5E-15 | 5E-15 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-13 | 7E-13 | -- | -- | -- | 0.000000003 | 0.000000003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00002 | 0.00002 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000001 | 0.000001 |
| | | | Arsenic | -- | -- | 3E-11 | 3E-11 | CV; DM; DV; NV; RP; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Cadmium (Diet) | -- | -- | 3E-11 | 3E-11 | UR | -- | -- | 0.00001 | 0.00001 |
| | | | Chromium, Total | -- | -- | 1E-09 | 1E-09 | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Cobalt | -- | -- | 4E-11 | 4E-11 | RS | -- | -- | 0.000006 | 0.000006 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000001 | 0.00000001 |
| | | | Nickel | -- | -- | 9E-11 | 9E-11 | RS | -- | -- | 0.00003 | 0.00003 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000001 | 0.000001 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-09 | 2E-09 | | -- | -- | 0.0002 | 0.0002 |
| | | Exposure Point Total | | | | | 2E-09 | | | | | 0.0002 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-22.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 6E-08 | 6E-08 | RS | -- | -- | 0.1 | 0.1 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.001 | 0.001 |
| | | | Benzene | -- | -- | 3E-09 | 3E-09 | IM | -- | -- | 0.0001 | 0.0001 |
| | | | Ethylbenzene | -- | -- | 3E-09 | 3E-09 | DV | -- | -- | 0.000009 | 0.000009 |
| | | | Naphthalene | -- | -- | 2E-09 | 2E-09 | NV; RS | -- | -- | 0.0001 | 0.0001 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | 0.000001 | 0.000001 |
| | | | Chemical Total | -- | -- | 7E-08 | 7E-08 | | -- | -- | 0.1 | 0.1 |
| | | Exposure Point Total | | | | | 7E-08 | | | | | 0.100 |
| | Exposure Medium Total | | | | | | 7E-08 | | | | | 0.1 |
| Medium Total | | | | | | | 2E-06 | | | | | 0.5 |
| Notes: | | | | | | Receptor Risk Total | 2E-06 | | | | Receptor Hazard Index (HI) | 0.5 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.007 |
| Total Dermal (DM) HI across All Media = | 0.02 |
| Total Developmental (DV) HI across All Media = | 0.06 |
| Total Endocrine (EN) HI across All Media = | 0.003 |
| Total Gastrointestinal (GI) HI across All Media = | 0.02 |
| Total Hematological (HM) HI across All Media = | 0.1 |
| Total Hepatic (HP) HI across All Media = | 0.002 |
| Total Immune (IM) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.04 |
| Total Other (OT) HI across All Media = | 0.1 |
| Total Reproductive (RP) HI across All Media = | 0.01 |
| Total Respiratory (RS) HI across All Media = | 0.1 |
| Total Urinary (UR) HI across All Media = | 0.006 |

Table 9-23.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.006 | 0.0003 | -- | 0.006 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.01 | 0.0007 | -- | 0.01 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.0003 | 0.0000003 | -- | 0.0003 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.00006 | 0.000003 | -- | 0.00007 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.0001 | 0.000006 | -- | 0.0001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.00008 | 0.000004 | -- | 0.00008 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.06 | 0.01 | -- | 0.08 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.003 | 0.0005 | -- | 0.003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.03 | 0.001 | -- | 0.03 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.01 | 0.0002 | -- | 0.01 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.2 | 0.02 | -- | 0.2 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.02 | 0.001 | -- | 0.02 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.02 | 0.001 | -- | 0.02 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.01 | 0.009 | -- | 0.02 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.02 | 0.0003 | -- | 0.02 |
| | | | Copper | -- | -- | -- | -- | GI | 0.06 | 0.0009 | -- | 0.06 |
| | | | Iron | -- | -- | -- | -- | GI | 0.07 | 0.001 | -- | 0.07 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.02 | 0.008 | -- | 0.03 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.004 | 0.0009 | -- | 0.005 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.02 | 0.008 | -- | 0.03 |
| | | | Silver | -- | -- | -- | -- | DM | 0.003 | 0.001 | -- | 0.005 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.007 | 0.0001 | -- | 0.007 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.003 | 0.002 | -- | 0.006 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.005 | 0.00008 | -- | 0.005 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.5 | 0.07 | -- | 0.6 |
| | | Exposure Point Total | | | | | -- | | | | | 0.6 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.6 |

Table 9-23.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00000005 | 0.00000005 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 8E-10 | 8E-10 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 1E-10 | 1E-10 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.00000002 | 0.00000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.000000003 | 0.000000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.0002 | 0.0002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000001 | 0.00000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00005 | 0.00005 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000004 | 0.000004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000004 | 0.00000004 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000003 | 0.000003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-23.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.3 | 0.3 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.0002 | 0.0002 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.00002 | 0.00002 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.0002 | 0.0002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.0004 | 0.0004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.000003 | 0.000003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.3 | 0.3 |
| | | Exposure Point Total | | | | | -- | | | | | 0.300 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.3 |
| Medium Total | | | | | | | -- | | | | | 0.9 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.9 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.02 |
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.08 |
| Total Endocrine (EN) HI across All Media = | 0.02 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.2 |
| Total Hepatic (HP) HI across All Media = | 0.003 |
| Total Immune (IM) HI across All Media = | 0.007 |
| Total Nervous (NV) HI across All Media = | 0.06 |
| Total Other (OT) HI across All Media = | 0.2 |
| Total Reproductive (RP) HI across All Media = | 0.03 |
| Total Respiratory (RS) HI across All Media = | 0.3 |
| Total Urinary (UR) HI across All Media = | 0.02 |

Table 9-24.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.0005 | 0.00001 | -- | 0.0005 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.001 | 0.00003 | -- | 0.001 |
| | | | Benzene | -- | -- | -- | -- | IM | 0.00003 | 0.00000001 | -- | 0.00003 |
| | | | Ethylbenzene | -- | -- | -- | -- | HP; UR | 0.000006 | 0.0000001 | -- | 0.000006 |
| | | | Naphthalene | -- | -- | -- | -- | OT | 0.00001 | 0.0000002 | -- | 0.00001 |
| | | | Xylenes, Total | -- | -- | -- | -- | OT | 0.000007 | 0.0000001 | -- | 0.000007 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.006 | 0.0005 | -- | 0.006 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.0003 | 0.00002 | -- | 0.0003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.003 | 0.00005 | -- | 0.003 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.001 | 0.000008 | -- | 0.001 |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.02 | 0.0007 | -- | 0.02 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.002 | 0.00005 | -- | 0.002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.002 | 0.00004 | -- | 0.002 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.001 | 0.0004 | -- | 0.002 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.002 | 0.00001 | -- | 0.002 |
| | | | Copper | -- | -- | -- | -- | GI | 0.005 | 0.00004 | -- | 0.006 |
| | | | Iron | -- | -- | -- | -- | GI | 0.006 | 0.00004 | -- | 0.006 |
| | | | Manganese | -- | -- | -- | -- | NV | 0.002 | 0.0003 | -- | 0.002 |
| | | | Mercury | -- | -- | -- | -- | -- | 0.0004 | 0.00003 | -- | 0.0004 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.002 | 0.0003 | -- | 0.002 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0003 | 0.00005 | -- | 0.0004 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0007 | 0.000004 | -- | 0.0007 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.0003 | 0.00008 | -- | 0.0004 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0005 | 0.000003 | -- | 0.0005 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.003 | -- | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.05 |

Table 9-24.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00000005 | 0.00000005 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 8E-10 | 8E-10 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 1E-10 | 1E-10 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.00000002 | 0.00000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.000000003 | 0.000000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | -- | -- | 0.0002 | 0.0002 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00000001 | 0.00000001 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00005 | 0.00005 |
| | | | Antimony | -- | -- | -- | -- | RS | -- | -- | 0.000004 | 0.000004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.00001 | 0.00001 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | -- | -- | 0.00003 | 0.00003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.0001 | 0.0001 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | NV | -- | -- | 0.0002 | 0.0002 |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.00000004 | 0.00000004 |
| | | | Nickel | -- | -- | -- | -- | RS | -- | -- | 0.00009 | 0.00009 |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | RS | -- | -- | 0.000003 | 0.000003 |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.0007 | 0.0007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.0007 |
| | | Vapors above Site | | | | | | | | | | |

Table 9-24.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.3 | 0.3 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.003 | 0.003 |
| | | | Benzene | -- | -- | -- | -- | IM | -- | -- | 0.0002 | 0.0002 |
| | | | Ethylbenzene | -- | -- | -- | -- | DV | -- | -- | 0.00002 | 0.00002 |
| | | | Naphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.0002 | 0.0002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.0004 | 0.0004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.000003 | 0.000003 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.3 | 0.3 |
| | | Exposure Point Total | | | | | -- | | | | | 0.300 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.3 |
| Medium Total | | | | | | | -- | | | | | 0.3 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.003 |
| Total Developmental (DV) HI across All Media = | 0.007 |
| Total Endocrine (EN) HI across All Media = | 0.002 |
| Total Gastrointestinal (GI) HI across All Media = | 0.01 |
| Total Hematological (HM) HI across All Media = | 0.02 |
| Total Hepatic (HP) HI across All Media = | 0.0003 |
| Total Immune (IM) HI across All Media = | 0.0008 |
| Total Nervous (NV) HI across All Media = | 0.008 |
| Total Other (OT) HI across All Media = | 0.02 |
| Total Reproductive (RP) HI across All Media = | 0.003 |
| Total Respiratory (RS) HI across All Media = | 0.3 |
| Total Urinary (UR) HI across All Media = | 0.002 |

Table 9-25.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | 1E-07 | 6E-09 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | 7E-09 | 5E-12 | -- | 7E-09 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | 7E-09 | 3E-10 | -- | 7E-09 | -- | -- | -- | -- | -- |
| | | | Naphthalene | 3E-08 | 1E-09 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | 7E-07 | 6E-08 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 3E-05 | 2E-06 | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 7E-07 | 6E-08 | -- | 8E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 4E-07 | 3E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 5E-07 | 4E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 2E-09 | 3E-10 | -- | 2E-09 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 3E-07 | 1E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 7E-07 | 5E-08 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 3E-05 | 7E-06 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 6E-05 | 1E-05 | -- | 7E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-05 | | | | | -- |

Table 9-25.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 8E-12 | 8E-12 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 2E-13 | 2E-13 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-13 | 3E-13 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 2E-12 | 2E-12 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 6E-12 | 6E-12 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | -- | -- | 7E-12 | 7E-12 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | 4E-12 | 4E-12 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | 1E-13 | 1E-13 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 7E-10 | 7E-10 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Manganese | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Mercury | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-08 | 2E-08 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 2E-08 | | | | | -- |
| | | Vapors above Site | | | | | | | | | | |

Table 9-25.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2-Trichloroethane | -- | -- | 9E-07 | 9E-07 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzene | -- | -- | 5E-08 | 5E-08 | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 5E-08 | 5E-08 | -- | -- | -- | -- | -- |
| | | | Naphthalene | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Xylenes, Total | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Benzo(a)anthracene | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 5E-09 | 5E-09 | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 1E-06 | 1E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-06 | | | | | -- |
| Medium Total | | | | | | | 7E-05 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 7E-05 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-26.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.004 | 0.0001 | -- | 0.004 |
| | | | Arsenic | 7E-08 | 1E-08 | -- | 8E-08 | CV; DM | 0.002 | 0.0002 | -- | 0.002 |
| | | | Chromium, Total | 2E-07 | 2E-07 | -- | 4E-07 | NA | 0.001 | 0.001 | -- | 0.003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.004 | 0.0001 | -- | 0.004 |
| | | | Iron | -- | -- | -- | -- | GI | 0.004 | 0.0001 | -- | 0.004 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.004 | 0.0001 | -- | 0.004 |
| | | | Chemical Total | 2E-07 | 2E-07 | -- | 5E-07 | | 0.02 | 0.002 | -- | 0.02 |
| | | Exposure Point Total | | | | | 5E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 5E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Arsenic | -- | -- | 1E-10 | 1E-10 | CV; DM; DV; NV; RP; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Chromium, Total | -- | -- | 2E-09 | 2E-09 | RS | -- | -- | 0.0002 | 0.0002 |
| | | | Cobalt | -- | -- | 4E-10 | 4E-10 | RS | -- | -- | 0.00008 | 0.00008 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 2E-09 | 2E-09 | | -- | -- | 0.0006 | 0.0006 |
| | | Exposure Point Total | | | | | 2E-09 | | | | | 0.0006 |
| | Exposure Medium Total | | | | | | 2E-09 | | | | | 0.0006 |
| Medium Total | | | | | | | 5E-07 | | | | | 0.02 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,2-Dichloroethane | -- | -- | 8E-12 | 8E-12 | NV | -- | -- | 0.0000005 | 0.0000005 |
| | | | Benzene | -- | -- | 9E-10 | 9E-10 | IM | -- | -- | 0.00004 | 0.00004 |
| | | | Chloroform | -- | -- | 5E-12 | 5E-12 | HP | -- | -- | 0.00000002 | 0.00000002 |
| | | | cis-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Ethylbenzene | -- | -- | 3E-10 | 3E-10 | DV | -- | -- | 0.000001 | 0.000001 |
| | | | Isopropylbenzene | -- | -- | -- | -- | EN | -- | -- | 0.0000003 | 0.0000003 |
| | | | Naphthalene | -- | -- | 2E-10 | 2E-10 | NV; RS | -- | -- | 0.00002 | 0.00002 |
| | | | Tetrachloroethene | -- | -- | 6E-13 | 6E-13 | NV | -- | -- | 0.0000006 | 0.0000006 |
| | | | Toluene | -- | -- | -- | -- | NV | -- | -- | 0.0000009 | 0.0000009 |
| | | | Trichloroethene | -- | -- | 2E-12 | 2E-12 | DV; IM | -- | -- | 0.000002 | 0.000002 |
| | | | Xylenes, Total | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |

Table 9-26.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.000002 | 0.000002 |
| | | | 2-Methylnaphthalene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Benzo(a)anthracene | -- | -- | 5E-15 | 5E-15 | -- | -- | -- | -- | -- |
| | | | Dibenzofuran | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 7E-12 | 7E-12 | -- | -- | -- | 0.00000005 | 0.00000005 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Mercury | -- | -- | -- | -- | NV | -- | -- | 0.0000008 | 0.0000008 |
| | | | Chemical Total | -- | -- | 1E-09 | 1E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 1E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 1E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 1E-09 | | | | | 0.0001 |
| | | | | | | Receptor Risk Total | 5E-07 | | | | Receptor Hazard Index (HI) | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.006 |
| Total Developmental (DV) HI across All Media = | 0.00003 |
| Total Endocrine (EN) HI across All Media = | 0.004 |
| Total Gastrointestinal (GI) HI across All Media = | 0.004 |
| Total Hepatic (HP) HI across All Media = | 0.000002 |
| Total Immune (IM) HI across All Media = | 0.00004 |
| Total Nervous (NV) HI across All Media = | 0.004 |
| Total Reproductive (RP) HI across All Media = | 0.00002 |
| Total Respiratory (RS) HI across All Media = | 0.0003 |
| Total Urinary (UR) HI across All Media = | 0.000002 |

Table 9-27.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.001 | 0.0006 | -- | 0.002 |
| | | | Arsenic | 3E-08 | 9E-08 | -- | 1E-07 | CV; DM | 0.0004 | 0.001 | -- | 0.002 |
| | | | Chromium, Total | 1E-07 | 2E-08 | -- | 1E-07 | NA | 0.0003 | 0.008 | -- | 0.008 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.001 | 0.0006 | -- | 0.002 |
| | | | Iron | -- | -- | -- | -- | GI | 0.001 | 0.0007 | -- | 0.002 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.001 | 0.0006 | -- | 0.002 |
| | | | Chemical Total | 1E-07 | 1E-07 | -- | 2E-07 | | 0.005 | 0.01 | -- | 0.02 |
| | | Exposure Point Total | | | | | 2E-07 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 2E-07 | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00001 | 0.00001 |
| | | | Arsenic | -- | -- | 8E-12 | 8E-12 | CV; DM; DV; NV; RP; RS | -- | -- | 0.0000008 | 0.0000008 |
| | | | Chromium, Total | -- | -- | 3E-10 | 3E-10 | RS | -- | -- | 0.000007 | 0.000007 |
| | | | Cobalt | -- | -- | 2E-11 | 2E-11 | RS | -- | -- | 0.000003 | 0.000003 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 3E-10 | 3E-10 | | -- | -- | 0.00002 | 0.00002 |
| | | Exposure Point Total | | | | | 3E-10 | | | | | 0.00002 |
| | Exposure Medium Total | | | | | | 3E-10 | | | | | 0.00002 |
| Medium Total | | | | | | | 2E-07 | | | | | 0.02 |
| | | | | | | Receptor Risk Total | 2E-07 | | | | Receptor Hazard Index (HI) | 0.02 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.002 |
| Total Dermal (DM) HI across All Media = | 0.003 |
| Total Developmental (DV) HI across All Media = | 0.0000008 |
| Total Endocrine (EN) HI across All Media = | 0.002 |
| Total Gastrointestinal (GI) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.002 |
| Total Reproductive (RP) HI across All Media = | 0.0000008 |
| Total Respiratory (RS) HI across All Media = | 0.00001 |

Table 9-28.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.009 | 0.0001 | -- | 0.01 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.004 | 0.0003 | -- | 0.004 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.003 | 0.002 | -- | 0.005 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.009 | 0.0001 | -- | 0.009 |
| | | | Iron | -- | -- | -- | -- | GI | 0.01 | 0.0002 | -- | 0.01 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.009 | 0.0001 | -- | 0.009 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.003 | -- | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.000009 | 0.000009 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.00007 | 0.00007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.00007 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | -- | | | | | 0.05 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.05 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.004 |
| Total Dermal (DM) HI across All Media = | 0.01 |
| Total Developmental (DV) HI across All Media = | 0.000003 |
| Total Endocrine (EN) HI across All Media = | 0.009 |
| Total Gastrointestinal (GI) HI across All Media = | 0.01 |
| Total Nervous (NV) HI across All Media = | 0.01 |
| Total Reproductive (RP) HI across All Media = | 0.000003 |
| Total Respiratory (RS) HI across All Media = | 0.00003 |

Table 9-29.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | 0.0009 | 0.000006 | -- | 0.0009 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.0004 | 0.00001 | -- | 0.0004 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.0003 | 0.00007 | -- | 0.0003 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.0009 | 0.000006 | -- | 0.0009 |
| | | | Iron | -- | -- | -- | -- | GI | 0.001 | 0.000006 | -- | 0.001 |
| | | | Thallium | -- | -- | -- | -- | DM | 0.0008 | 0.000005 | -- | 0.0008 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.004 | 0.0001 | -- | 0.004 |
| | | Exposure Point Total | | | | | -- | | | | | 0.004 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.004 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | NV | -- | -- | 0.00004 | 0.00004 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM; DV; NV; RP; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Chromium, Total | -- | -- | -- | -- | RS | -- | -- | 0.00002 | 0.00002 |
| | | | Cobalt | -- | -- | -- | -- | RS | -- | -- | 0.000009 | 0.000009 |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.00007 | 0.00007 |
| | | Exposure Point Total | | | | | -- | | | | | 0.00007 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.00007 |
| Medium Total | | | | | | | -- | | | | | 0.004 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.004 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.0004 |
| Total Dermal (DM) HI across All Media = | 0.001 |
| Total Developmental (DV) HI across All Media = | 0.000003 |
| Total Endocrine (EN) HI across All Media = | 0.0009 |
| Total Gastrointestinal (GI) HI across All Media = | 0.001 |
| Total Nervous (NV) HI across All Media = | 0.0009 |
| Total Reproductive (RP) HI across All Media = | 0.000003 |
| Total Respiratory (RS) HI across All Media = | 0.00003 |

Table 9-30.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Northern/Western)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 2E-07 | 1E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 6E-06 | 1E-06 | -- | 7E-06 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 6E-06 | 1E-06 | -- | 7E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 7E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 7E-06 | | | | | -- |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Aluminum | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | -- | -- | 2E-10 | 2E-10 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 3E-09 | 3E-09 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 3E-09 | | | | | -- |
| | Exposure Medium Total | | | | | | 3E-09 | | | | | -- |
| Medium Total | | | | | | | 7E-06 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 7E-06 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-31.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 6E-08 | 3E-09 | -- | 6E-08 | CV; DM | 0.0009 | 0.00004 | -- | 0.001 |
| | | | Chromium, Total | 7E-07 | 1E-07 | -- | 8E-07 | NA | 0.0005 | 0.0002 | -- | 0.0007 |
| | | | Chemical Total | 7E-07 | 1E-07 | -- | 9E-07 | | 0.001 | 0.0002 | -- | 0.002 |
| | | Exposure Point Total | | | | | 9E-07 | | | | | 0.002 |
| | Exposure Medium Total | | | | | | 9E-07 | | | | | 0.002 |
| Medium Total | | | | | | | 9E-07 | | | | | 0.002 |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 7E-11 | 7E-11 | -- | 1E-10 | HP | 0.00007 | 0.00007 | -- | 0.0001 |
| | | | 4,4'-DDE | 6E-09 | 6E-09 | -- | 1E-08 | HP | 0.0004 | 0.0004 | -- | 0.0008 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 6E-10 | 6E-10 | -- | 1E-09 | CV; DM | 0.000009 | 0.000009 | -- | 0.00002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.00000003 | 0.00000003 | -- | 0.00000005 |
| | | | Chromium, Total | 7E-09 | 7E-09 | -- | 1E-08 | NA | 0.000005 | 0.000005 | -- | 0.00001 |
| | | | Copper | -- | -- | -- | -- | GI | 0.0000008 | 0.0000008 | -- | 0.000002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.0000002 | 0.0000002 | -- | 0.0000004 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.0000002 | 0.0000002 | -- | 0.0000004 |
| | | | Silver | -- | -- | -- | -- | DM | 0.00000008 | 0.00000008 | -- | 0.0000002 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0000006 | 0.0000006 | -- | 0.000001 |
| | | | Chemical Total | 1E-08 | 1E-08 | -- | 3E-08 | | 0.0005 | 0.0005 | -- | 0.001 |
| | | Exposure Point Total | | | | | 3E-08 | | | | | 0.001 |
| | Exposure Medium Total | | | | | | 3E-08 | | | | | 0.001 |
| Medium Total | | | | | | | 3E-08 | | | | | 0.001 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.0005 | 0.0003 | -- | 0.0008 |
| | | | Arsenic | 8E-08 | 6E-09 | -- | 9E-08 | CV; DM | 0.001 | 0.00009 | -- | 0.001 |
| | | | Iron | -- | -- | -- | -- | GI | 0.00005 | 0.000004 | -- | 0.00005 |
| | | | Chemical Total | 8E-08 | 6E-09 | -- | 9E-08 | | 0.002 | 0.0003 | -- | 0.002 |
| | | Exposure Point Total | | | | | 9E-08 | | | | | 0.002 |
| | Exposure Medium Total | | | | | | 9E-08 | | | | | 0.002 |
| Medium Total | | | | | | | 9E-08 | | | | | 0.002 |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 2E-08 | 2E-08 | -- | 5E-08 | CV; DM | 0.0004 | 0.0004 | -- | 0.0008 |

Table 9-31.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | 3E-09 | 3E-09 | -- | 5E-09 | NA | 0.000004 | 0.000004 | -- | 0.000009 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.0000005 | 0.0000005 | -- | 0.000001 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.00002 | 0.00002 | -- | 0.00003 |
| | | | Chemical Total | 3E-08 | 3E-08 | -- | 5E-08 | | 0.0004 | 0.0004 | -- | 0.0008 |
| | | Exposure Point Total | | | | | 5E-08 | | | | | 0.0008 |
| | Exposure Medium Total | | | | | | 5E-08 | | | | | 0.0008 |
| Medium Total | | | | | | | 5E-08 | | | | | 0.0008 |
| Notes: | | | | | | Receptor Risk Total | 1E-06 | | | | Receptor Hazard Index (HI) | 0.006 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.003 |
| Total Dermal (DM) HI across All Media = | 0.003 |
| Total Gastrointestinal (GI) HI across All Media = | 0.00005 |
| Total Hematological (HM) HI across All Media = | 0.0008 |
| Total Hepatic (HP) HI across All Media = | 0.001 |
| Total Other (OT) HI across All Media = | 0.0008 |
| Total Urinary (UR) HI across All Media = | 0.00000005 |

Table 9-32.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.01 | 0.0008 | -- | 0.01 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.006 | 0.004 | -- | 0.01 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.02 | 0.005 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.0007 | 0.0007 | -- | 0.001 |
| | | | 4,4'-DDE | -- | -- | -- | -- | HP | 0.005 | 0.005 | -- | 0.009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.0001 | 0.0001 | -- | 0.0002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.0000003 | 0.0000003 | -- | 0.0000006 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.00006 | 0.00006 | -- | 0.0001 |
| | | | Copper | -- | -- | -- | -- | GI | 0.000008 | 0.000008 | -- | 0.00002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.000002 | 0.000002 | -- | 0.000004 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.000002 | 0.000002 | -- | 0.000004 |
| | | | Silver | -- | -- | -- | -- | DM | 0.0000009 | 0.0000009 | -- | 0.000002 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.000007 | 0.000007 | -- | 0.00001 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.005 | 0.005 | -- | 0.01 |
| | | Exposure Point Total | | | | | -- | | | | | 0.01 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.01 |
| Medium Total | | | | | | | -- | | | | | 0.01 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.006 | 0.002 | -- | 0.008 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.02 | 0.0006 | -- | 0.02 |
| | | | Iron | -- | -- | -- | -- | GI | 0.0006 | 0.00002 | -- | 0.0006 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.02 | 0.002 | -- | 0.03 |
| | | Exposure Point Total | | | | | -- | | | | | 0.03 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | -- | | | | | 0.03 |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.005 | 0.005 | -- | 0.01 |

Table 9-32.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.00006 | 0.00006 | -- | 0.0001 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.000006 | 0.000006 | -- | 0.00001 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.0002 | 0.0002 | -- | 0.0004 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.005 | 0.005 | -- | 0.01 |
| | | Exposure Point Total | | | | | -- | | | | | 0.01 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.01 |
| Medium Total | | | | | | | -- | | | | | 0.01 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.07 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.04 |
| Total Dermal (DM) HI across All Media = | 0.04 |
| Total Gastrointestinal (GI) HI across All Media = | 0.0007 |
| Total Hematological (HM) HI across All Media = | 0.008 |
| Total Hepatic (HP) HI across All Media = | 0.01 |
| Total Other (OT) HI across All Media = | 0.009 |
| Total Urinary (UR) HI across All Media = | 0.0000006 |

Table 9-33.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.001 | 0.0001 | -- | 0.001 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.0006 | 0.0005 | -- | 0.001 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.002 | 0.0007 | -- | 0.002 |
| | | Exposure Point Total | | | | | -- | | | | | 0.002 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.002 |
| Medium Total | | | | | | | -- | | | | | 0.002 |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.00007 | 0.00007 | -- | 0.0001 |
| | | | 4,4'-DDE | -- | -- | -- | -- | HP | 0.0004 | 0.0004 | -- | 0.0009 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.000009 | 0.000009 | -- | 0.00002 |
| | | | Cadmium (Diet) | -- | -- | -- | -- | UR | 0.00000003 | 0.00000003 | -- | 0.00000005 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.000006 | 0.000006 | -- | 0.00001 |
| | | | Copper | -- | -- | -- | -- | GI | 0.0000008 | 0.0000008 | -- | 0.000002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.0000002 | 0.0000002 | -- | 0.0000004 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.0000002 | 0.0000002 | -- | 0.0000004 |
| | | | Silver | -- | -- | -- | -- | DM | 0.00000009 | 0.00000009 | -- | 0.0000002 |
| | | | Zinc | -- | -- | -- | -- | HM | 0.0000006 | 0.0000006 | -- | 0.000001 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.0005 | 0.0005 | -- | 0.001 |
| | | Exposure Point Total | | | | | -- | | | | | 0.001 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.001 |
| Medium Total | | | | | | | -- | | | | | 0.001 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.0009 | 0.001 | -- | 0.002 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.002 | 0.0004 | -- | 0.003 |
| | | | Iron | -- | -- | -- | -- | GI | 0.00008 | 0.00001 | -- | 0.0001 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.003 | 0.001 | -- | 0.005 |
| | | Exposure Point Total | | | | | -- | | | | | 0.005 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.005 |
| Medium Total | | | | | | | -- | | | | | 0.005 |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.0007 | 0.0007 | -- | 0.001 |

Table 9-33.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.000008 | 0.000008 | -- | 0.00002 |
| | | | Nickel | -- | -- | -- | -- | OT | 0.0000008 | 0.0000008 | -- | 0.000002 |
| | | | Selenium | -- | -- | -- | -- | OT | 0.00003 | 0.00003 | -- | 0.00005 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.0007 | 0.0007 | -- | 0.001 |
| | | Exposure Point Total | | | | | -- | | | | | 0.001 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.001 |
| Medium Total | | | | | | | -- | | | | | 0.001 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.009 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.005 |
| Total Dermal (DM) HI across All Media = | 0.005 |
| Total Gastrointestinal (GI) HI across All Media = | 0.0001 |
| Total Hematological (HM) HI across All Media = | 0.002 |
| Total Hepatic (HP) HI across All Media = | 0.001 |
| Total Other (OT) HI across All Media = | 0.002 |
| Total Urinary (UR) HI across All Media = | 0.00000005 |

Table 9-34.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 4E-07 | 4E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 9E-06 | 3E-06 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | Chemical Total | 9E-06 | 3E-06 | -- | 1E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 1E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 1E-05 | | | | | -- |
| Medium Total | | | | | | | 1E-05 | | | | | -- |
| Sediment | Sediment | Blue Crab Tissue | | | | | | | | | | |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 5E-10 | 5E-10 | -- | 1E-09 | -- | -- | -- | -- | -- |
| | | | 4,4'-DDE | 4E-08 | 4E-08 | -- | 9E-08 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 4E-09 | 4E-09 | -- | 8E-09 | -- | -- | -- | -- | -- |
| | | | Cadmium (Diet) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 9E-08 | 9E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Copper | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Selenium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Silver | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Zinc | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 1E-07 | 1E-07 | -- | 3E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 3E-07 | | | | | -- |
| | Exposure Medium Total | | | | | | 3E-07 | | | | | -- |
| Medium Total | | | | | | | 3E-07 | | | | | -- |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 7E-07 | 4E-08 | -- | 8E-07 | -- | -- | -- | -- | -- |
| | | | Iron | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 7E-07 | 4E-08 | -- | 8E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 8E-07 | | | | | -- |
| | Exposure Medium Total | | | | | | 8E-07 | | | | | -- |
| Medium Total | | | | | | | 8E-07 | | | | | -- |
| Surface Water | Surface Water | Fish Tissue | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 2E-07 | 2E-07 | -- | 4E-07 | -- | -- | -- | -- | -- |

Table 9-34.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Sediment to Blue Crab, Surface Water, Surface Water to Fish Tissue
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Chromium, Total | 4E-08 | 4E-08 | -- | 9E-08 | -- | -- | -- | -- | -- |
| | | | Nickel | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Selenium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 3E-07 | 3E-07 | -- | 5E-07 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 5E-07 | | | | | -- |
| | Exposure Medium Total | | | | | | 5E-07 | | | | | -- |
| Medium Total | | | | | | | 5E-07 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 1E-05 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-35.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Maintenance Worker - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 4E-07 | 6E-08 | -- | 4E-07 | CV; DM | 0.009 | 0.001 | -- | 0.01 |
| | | | Chromium, Total | 5E-07 | 5E-07 | -- | 1E-06 | NA | 0.003 | 0.004 | -- | 0.007 |
| | | | Chemical Total | 8E-07 | 6E-07 | -- | 1E-06 | | 0.01 | 0.005 | -- | 0.02 |
| | | Exposure Point Total | | | | | 1E-06 | | | | | 0.02 |
| | Exposure Medium Total | | | | | | 1E-06 | | | | | 0.02 |
| Medium Total | | | | | | | 1E-06 | | | | | 0.02 |
| Notes: | | | | | | Receptor Risk Total | 1E-06 | | | | Receptor Hazard Index (HI) | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.01 |
| Total Dermal (DM) HI across All Media = | 0.01 |

Table 9-36.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Trespasser (Teen) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 6E-08 | 3E-09 | -- | 7E-08 | CV; DM | 0.001 | 0.00005 | -- | 0.001 |
| | | | Chromium, Total | 4E-07 | 8E-08 | -- | 5E-07 | NA | 0.0003 | 0.0001 | -- | 0.0005 |
| | | | Chemical Total | 5E-07 | 8E-08 | -- | 6E-07 | | 0.001 | 0.0002 | -- | 0.002 |
| | | Exposure Point Total | | | | | 6E-07 | | | | | 0.002 |
| | Exposure Medium Total | | | | | | 6E-07 | | | | | 0.002 |
| Medium Total | | | | | | | 6E-07 | | | | | 0.002 |
| Notes: | | | | | | Receptor Risk Total | 6E-07 | | | | Receptor Hazard Index (HI) | 0.002 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.001 |
| Total Dermal (DM) HI across All Media = | 0.001 |

Table 9-37.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Child) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.01 | 0.0009 | -- | 0.01 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.004 | 0.002 | -- | 0.006 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.01 | 0.003 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.02 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.01 |
| Total Dermal (DM) HI across All Media = | 0.01 |

Table 9-38.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.001 | 0.0001 | -- | 0.001 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.0004 | 0.0003 | -- | 0.0007 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.001 | 0.0005 | -- | 0.002 |
| | | Exposure Point Total | | | | | -- | | | | | 0.002 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.002 |
| Medium Total | | | | | | | -- | | | | | 0.002 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.002 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.001 |
| Total Dermal (DM) HI across All Media = | 0.001 |

Table 9-39.CTE
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Central Tendency Exposure (Upgradient Drainage)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment
Remedial Investigation Report
Project 15 CDL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | Metals (Total) | | | | | | | | | |
| | | | Arsenic | 5E-07 | 4E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 6E-06 | 2E-06 | -- | 8E-06 | -- | -- | -- | -- | -- |
| | | | Chemical Total | 6E-06 | 2E-06 | -- | 8E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 8E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 8E-06 | | | | | -- |
| Medium Total | | | | | | | 8E-06 | | | | | -- |
| | | | | | | Receptor Risk Total | 8E-06 | | | | Receptor Hazard Index (HI) | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

# Attachment 6

## Human Health Risk Assessment Data Sensitivity Analysis

# Calculation of Chemical Cancer Risks and Non-Cancer Hazards: Data Sensitivity Analysis

Table 7-1.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 2.75E-07 | mg/kg-day | -- | -- | -- | 7.71E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.08 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.08 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 1.16E-08 | mg/kg-day | -- | -- | -- | 3.26E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.08 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.08 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | 5.40E-08 | µg/m³ | -- | -- | -- | 1.51E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.08 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.84E-05 | µg/m³ | 1.50E-06 | µg/m³ | 5.80E-05 | m³/µg | 9E-11 | 4.20E-06 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.32E-05 | µg/m³ | 1.89E-06 | µg/m³ | 1.60E-05 | m³/µg | 3E-11 | 5.29E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00003 |
| | | | | 1,1-Dichloroethane | 2.64E-05 | µg/m³ | 2.15E-06 | µg/m³ | 1.60E-06 | m³/µg | 3E-12 | 6.02E-06 | µg/m³ | 5.00E+02 | µg/m³ | 0.00000001 |
| | | | | 1,1-Dichloroethene | 1.14E-04 | µg/m³ | 9.26E-06 | µg/m³ | -- | -- | -- | 2.59E-05 | µg/m³ | 2.00E+02 | µg/m³ | 0.0000001 |
| | | | | 1,2,4-Trichlorobenzene | 1.56E-05 | µg/m³ | 1.28E-06 | µg/m³ | -- | -- | -- | 3.57E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000002 |
| | | | | 1,2-Dibromo-3-chloropropane | 8.86E-06 | µg/m³ | 7.22E-07 | µg/m³ | 6.00E-03 | m³/µg | 4E-09 | 2.02E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00001 |
| | | | | 1,2-Dibromoethane | 1.71E-05 | µg/m³ | 1.40E-06 | µg/m³ | 6.00E-04 | m³/µg | 8E-10 | 3.91E-06 | µg/m³ | 9.00E+00 | µg/m³ | 0.0000004 |
| | | | | 1,2-Dichloropropane | 1.77E-05 | µg/m³ | 1.45E-06 | µg/m³ | 3.70E-06 | m³/µg | 5E-12 | 4.05E-06 | µg/m³ | 4.00E+00 | µg/m³ | 0.000001 |
| | | | | 1,2-Dichlorobenzene | 1.04E-05 | µg/m³ | 8.49E-07 | µg/m³ | -- | -- | -- | 2.38E-06 | µg/m³ | 2.00E+02 | µg/m³ | 0.00000001 |
| | | | | 1,3-Dichlorobenzene | 1.67E-05 | µg/m³ | 1.36E-06 | µg/m³ | -- | -- | -- | 3.82E-06 | µg/m³ | 2.00E+02 | µg/m³ | 0.00000002 |
| | | | | 1,4-Dichlorobenzene | 1.34E-05 | µg/m³ | 1.09E-06 | µg/m³ | 1.10E-05 | m³/µg | 1E-11 | 3.06E-06 | µg/m³ | 8.00E+02 | µg/m³ | 4E-09 |
| | | | | 2-Hexanone | 1.49E-05 | µg/m³ | 1.22E-06 | µg/m³ | -- | -- | -- | 3.41E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000001 |
| | | | | Bromodichloromethane | 9.91E-06 | µg/m³ | 8.08E-07 | µg/m³ | 3.70E-05 | m³/µg | 3E-11 | 2.26E-06 | µg/m³ | -- | -- | -- |
| | | | | Bromoform | 1.38E-05 | µg/m³ | 1.13E-06 | µg/m³ | 1.10E-06 | m³/µg | 1E-12 | 3.16E-06 | µg/m³ | -- | -- | -- |
| | | | | Bromomethane | 5.96E-05 | µg/m³ | 4.86E-06 | µg/m³ | -- | -- | -- | 1.36E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.000003 |
| | | | | Carbon Tetrachloride | 7.48E-05 | µg/m³ | 6.10E-06 | µg/m³ | 6.00E-06 | m³/µg | 4E-11 | 1.71E-05 | µg/m³ | 1.00E+02 | µg/m³ | 0.0000002 |
| | | | | Chlorobenzene | 1.73E-05 | µg/m³ | 1.41E-06 | µg/m³ | -- | -- | -- | 3.96E-06 | µg/m³ | 5.00E+01 | µg/m³ | 0.00000008 |
| | | | | Chloromethane | 7.94E-05 | µg/m³ | 6.47E-06 | µg/m³ | 1.80E-06 | m³/µg | 1E-11 | 1.81E-05 | µg/m³ | 9.00E+01 | µg/m³ | 0.0000002 |
| | | | | cis-1,3-Dichloropropene | 3.07E-05 | µg/m³ | 2.50E-06 | µg/m³ | 4.00E-06 | m³/µg | 1E-11 | 7.01E-06 | µg/m³ | 2.00E+01 | µg/m³ | 0.0000004 |
| | | | | Dibromochloromethane | 1.03E-05 | µg/m³ | 8.42E-07 | µg/m³ | -- | -- | -- | 2.36E-06 | µg/m³ | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 3.01E-03 | µg/m³ | 2.45E-04 | µg/m³ | -- | -- | -- | 6.87E-04 | µg/m³ | 1.00E+02 | µg/m³ | 0.000007 |
| | | | | Hexachlorobutadiene | 2.51E-06 | µg/m³ | 2.05E-07 | µg/m³ | 2.20E-05 | m³/µg | 5E-12 | 5.74E-07 | µg/m³ | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.23E-05 | µg/m³ | 1.00E-06 | µg/m³ | 2.60E-07 | m³/µg | 3E-13 | 2.81E-06 | µg/m³ | 3.00E+03 | µg/m³ | 9E-10 |
| | | | | Methylene Chloride | 2.47E-05 | µg/m³ | 2.01E-06 | µg/m³ | 1.00E-08 | m³/µg | 2E-14 | 5.63E-06 | µg/m³ | 6.00E+02 | µg/m³ | 9E-09 |
| | | | | trans-1,2-Dichloroethene | 6.82E-05 | µg/m³ | 5.56E-06 | µg/m³ | -- | -- | -- | 1.56E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000004 |
| | | | | trans-1,3-Dichloropropene | 4.09E-05 | µg/m³ | 3.34E-06 | µg/m³ | 4.00E-06 | m³/µg | 1E-11 | 9.34E-06 | µg/m³ | 2.00E+01 | µg/m³ | 0.0000005 |
| | | | | Vinyl Chloride | 1.33E-04 | µg/m³ | 1.09E-05 | µg/m³ | 4.40E-06 | m³/µg | 5E-11 | 3.04E-05 | µg/m³ | 1.00E+02 | µg/m³ | 0.0000003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 1.26E-07 | µg/m³ | 1.03E-08 | µg/m³ | 3.30E-04 | m³/µg | 3E-12 | 2.88E-08 | µg/m³ | -- | -- | -- |

Table 7-1.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Hexachlorobenzene | 2.29E-06 | µg/m³ | 1.87E-07 | µg/m³ | 4.60E-04 | m³/µg | 9E-11 | 5.22E-07 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 3.68E-05 | µg/m³ | 3.00E-06 | µg/m³ | -- | -- | -- | 8.40E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00004 |
| | | | | Hexachloroethane | 2.41E-06 | µg/m³ | 1.97E-07 | µg/m³ | 1.10E-05 | m³/µg | 2E-12 | 5.51E-07 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000002 |
| | | | | Nitrobenzene | 2.11E-07 | µg/m³ | 1.72E-08 | µg/m³ | 4.00E-05 | m³/µg | 7E-13 | 4.81E-08 | µg/m³ | 9.00E+00 | µg/m³ | 5E-09 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.59E-09 | µg/m³ | 1.30E-10 | µg/m³ | 4.90E-03 | m³/µg | 6E-13 | 3.64E-10 | µg/m³ | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 1.15E-06 | µg/m³ | 9.39E-08 | µg/m³ | 5.71E-04 | m³/µg | 5E-11 | 2.63E-07 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1232 | 9.69E-07 | µg/m³ | 7.90E-08 | µg/m³ | 5.71E-04 | m³/µg | 5E-11 | 2.21E-07 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1242 | 2.34E-07 | µg/m³ | 1.91E-08 | µg/m³ | 5.71E-04 | m³/µg | 1E-11 | 5.34E-08 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1248 | 6.32E-08 | µg/m³ | 5.15E-09 | µg/m³ | 5.71E-04 | m³/µg | 3E-12 | 1.44E-08 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1254 | 3.24E-07 | µg/m³ | 2.64E-08 | µg/m³ | 5.71E-04 | m³/µg | 2E-11 | 7.40E-08 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1260 | 4.43E-07 | µg/m³ | 3.62E-08 | µg/m³ | 5.71E-04 | m³/µg | 2E-11 | 1.01E-07 | µg/m³ | -- | -- | -- |
| | | | | Cyanide | 3.66E-05 | µg/m³ | 2.99E-06 | µg/m³ | -- | -- | -- | 8.36E-06 | µg/m³ | 8.00E-01 | µg/m³ | 0.00001 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 6E-09 | | | | | 0.08 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-2.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 3.63E-08 | mg/kg-day | -- | -- | -- | 2.54E-06 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.06 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.06 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 1.16E-09 | mg/kg-day | -- | -- | -- | 8.15E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.07 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.07 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 8.48E-05 | µg/m³ | 2.76E-07 | µg/m³ | -- | -- | -- | 1.94E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.07 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 5.14E-09 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-09 | 3.60E-07 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.000007 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 3.15E-09 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-10 | 2.20E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00006 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 1.48E-09 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 8E-12 | 1.03E-07 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.00000005 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 2.12E-09 | mg/kg-day | -- | -- | -- | 1.48E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 2.63E-09 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 8E-11 | 1.84E-07 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.000002 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 7.06E-09 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 6E-09 | 4.94E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0002 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 3.34E-09 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-09 | 2.34E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00003 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 1.54E-09 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 6E-12 | 1.08E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.000003 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | -- | -- | -- | 8.99E-08 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0000001 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 2.05E-09 | mg/kg-day | -- | -- | -- | 1.44E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 1.54E-09 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 8E-12 | 1.08E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000002 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 8.35E-09 | mg/kg-day | -- | -- | -- | 5.84E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 1.09E-09 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 7E-11 | 7.64E-08 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00001 |
| | | | | Bromoform | 2.70E-03 | mg/L | 3.47E-09 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 3E-11 | 2.43E-07 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.000008 |
| | | | | Bromomethane | 1.90E-03 | mg/L | 2.44E-09 | mg/kg-day | -- | -- | -- | 1.71E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00003 |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 1.86E-09 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 1E-10 | 1.30E-07 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.00002 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 1.41E-09 | mg/kg-day | -- | -- | -- | 9.89E-08 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000001 |
| | | | | Chloromethane | 1.75E-03 | mg/L | 2.25E-09 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 3E-11 | 1.57E-07 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 9.63E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-10 | 6.74E-08 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.000002 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 1.80E-09 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 2E-10 | 1.26E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000002 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 6.42E-09 | mg/kg-day | -- | -- | -- | 4.49E-07 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.000009 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 2E-11 | 1.98E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00002 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 1.99E-09 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 4E-12 | 1.39E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0000005 |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 1.73E-09 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 3E-12 | 1.21E-07 | mg/kg-day | 6.00E-02 | mg/kg-day | 0.000002 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 2.70E-09 | mg/kg-day | -- | -- | -- | 1.89E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0000009 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-10 | 8.99E-08 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.000002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 1.86E-09 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 1E-09 | 1.30E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 8.99E-10 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-11 | 6.29E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00006 |

Table 7-2.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 2.31E-09 | mg/kg-day | -- | -- | -- | 1.62E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000008 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-10 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-10 | 4.94E-08 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.000007 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-09 | 4.94E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000005 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | -- | -- | -- | 8.99E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.0009 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 1.41E-09 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 6E-10 | 9.89E-08 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 2.89E-09 | mg/kg-day | -- | -- | -- | 2.02E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0003 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 6E-11 | 1.98E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00004 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 1.16E-09 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 2E-11 | 8.09E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000008 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 1.41E-09 | mg/kg-day | -- | -- | -- | 9.89E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.001 |
| | | | | Atrazine | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 6E-11 | 1.98E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000007 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 4.30E-10 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 5E-10 | 3.01E-08 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | 2.89E-09 | mg/kg-day | 1.40E-02 | 1/(mg/kg-day) | 4E-11 | 2.02E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000002 |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 2.89E-09 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 5E-12 | 2.02E-07 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.0000001 |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | 3.79E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-10 | 2.65E-08 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | 5.65E-10 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 9E-10 | 3.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 2.31E-09 | mg/kg-day | -- | -- | -- | 1.62E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000002 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 1E-11 | 1.98E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000002 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | 5.07E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-11 | 3.55E-08 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 5.65E-10 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 4E-09 | 3.96E-08 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 4.56E-10 | mg/kg-day | -- | -- | -- | 3.19E-08 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.000006 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 1.35E-09 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 5E-10 | 9.44E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00009 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | 2.38E-12 | mg/kg-day | 1.70E+01 | 1/(mg/kg-day) | 4E-11 | 1.66E-10 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.000004 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 3.34E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-10 | 2.34E-08 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 2.76E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 6E-10 | 1.93E-08 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | 1.16E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 8.09E-09 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | 1.09E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 7.64E-09 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | 7.71E-11 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 5.39E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0002 |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | 8.35E-11 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 5.84E-09 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 6.42E-09 | mg/kg-day | -- | -- | -- | 4.49E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 3E-08 | | | | | 0.007 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 3.45E-08 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 7E-09 | 2.41E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.00005 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 1.36E-08 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 8E-10 | 9.53E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 7.82E-09 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 4E-11 | 5.48E-07 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.0000003 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 1.91E-08 | mg/kg-day | -- | -- | -- | 1.34E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 1.82E-07 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 5E-09 | 1.28E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 6.68E-08 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 5E-08 | 4.68E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.002 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 9.90E-09 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-08 | 6.93E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00008 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 9.38E-09 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 3E-11 | 6.56E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00002 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 4.80E-08 | mg/kg-day | -- | -- | -- | 3.36E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000006 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 7.69E-08 | mg/kg-day | -- | -- | -- | 5.38E-06 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.00008 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 5.85E-08 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 3E-10 | 4.09E-06 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.00006 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 2.35E-08 | mg/kg-day | -- | -- | -- | 1.65E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0003 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 4.20E-09 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 3E-10 | 2.94E-07 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00004 |
| | | | | Bromoform | 2.70E-03 | mg/L | 1.25E-08 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 1E-10 | 8.76E-07 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.00003 |
| | | | | Bromomethane | 1.90E-03 | mg/L | 5.45E-09 | mg/kg-day | -- | -- | -- | 3.81E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00008 |

Table 7-2.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 2.73E-08 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 2E-09 | 1.91E-06 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.0003 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 3.07E-08 | mg/kg-day | -- | -- | -- | 2.15E-06 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.00003 |
| | | | | Chloromethane | 1.75E-03 | mg/L | 5.41E-09 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 7E-11 | 3.79E-07 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 6.45E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-10 | 4.51E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00001 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 6.17E-09 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 5E-10 | 4.32E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000006 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 4.72E-08 | mg/kg-day | -- | -- | -- | 3.31E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.00007 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 3.33E-08 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 3E-09 | 2.33E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 3.27E-09 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 6E-12 | 2.29E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0000008 |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 4.73E-09 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 9E-12 | 3.31E-07 | mg/kg-day | 6.00E-02 | mg/kg-day | 0.000006 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 2.29E-08 | mg/kg-day | -- | -- | -- | 1.61E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000008 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 8.60E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-10 | 6.02E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 1.15E-08 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 8E-09 | 8.04E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 3.42E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 4E-10 | 2.39E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 4.53E-09 | mg/kg-day | -- | -- | -- | 3.17E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 2.26E-09 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 7E-10 | 1.58E-07 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.00002 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 2.71E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-09 | 1.90E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00002 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 7.21E-10 | mg/kg-day | -- | -- | -- | 5.05E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.0005 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 2.78E-08 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 1E-08 | 1.95E-06 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 1.02E-08 | mg/kg-day | -- | -- | -- | 7.15E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0009 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 1.18E-09 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 2E-10 | 8.29E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0002 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 2.24E-09 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 4E-11 | 1.57E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00002 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 7.93E-10 | mg/kg-day | -- | -- | -- | 5.55E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.0006 |
| | | | | Atrazine | 2.20E-04 | mg/L | 1.79E-09 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 4E-10 | 1.25E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00004 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 6.83E-10 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 8E-10 | 4.78E-08 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 2.26E-07 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 4E-10 | 1.58E-05 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.000008 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 3.74E-07 | mg/kg-day | -- | -- | -- | 2.62E-05 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0003 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 1.62E-08 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 6E-10 | 1.14E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 1.13E-09 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 8E-09 | 7.89E-08 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 2.06E-09 | mg/kg-day | -- | -- | -- | 1.44E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00003 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 2.58E-07 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 1E-07 | 1.81E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 5.70E-08 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 1E-07 | 3.99E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 4.71E-08 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 9E-08 | 3.30E-06 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 4.62E-09 | mg/kg-day | -- | -- | -- | 3.24E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | 5E-07 | | | | | 0.04 |
| | Exp. Medium Total | | | | | | | | | | 5E-07 | | | | | 0.04 |
| | Outdoor Air | Trench (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 2.23E+01 | µg/m³ | 1.82E-02 | µg/m³ | 5.80E-05 | m³/µg | 1E-06 | 1.27E+00 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 1.67E+01 | µg/m³ | 1.36E-02 | µg/m³ | 1.60E-05 | m³/µg | 2E-07 | 9.53E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.5 |
| | | | | 1,1-Dichloroethane | 9.55E+00 | µg/m³ | 7.79E-03 | µg/m³ | 1.60E-06 | m³/µg | 1E-08 | 5.45E-01 | µg/m³ | 5.00E+03 | µg/m³ | 0.0001 |
| | | | | 1,1-Dichloroethene | 1.40E+01 | µg/m³ | 1.14E-02 | µg/m³ | -- | -- | -- | 7.97E-01 | µg/m³ | 4.00E+00 | µg/m³ | 0.2 |
| | | | | 1,2,4-Trichlorobenzene | 1.22E+01 | µg/m³ | 9.99E-03 | µg/m³ | -- | -- | -- | 6.99E-01 | µg/m³ | 2.00E+01 | µg/m³ | 0.03 |
| | | | | 1,2-Dibromo-3-chloropropane | 2.22E+01 | µg/m³ | 1.81E-02 | µg/m³ | 6.00E-03 | m³/µg | 1E-04 | 1.27E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.6 |
| | | | | 1,2-Dibromoethane | 1.48E+01 | µg/m³ | 1.21E-02 | µg/m³ | 6.00E-04 | m³/µg | 7E-06 | 8.44E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.4 |
| | | | | 1,2-Dichloropropane | 9.24E+00 | µg/m³ | 7.53E-03 | µg/m³ | 3.70E-06 | m³/µg | 3E-08 | 5.27E-01 | µg/m³ | 9.24E+00 | µg/m³ | 0.06 |
| | | | | 1,2-Dichlorobenzene | 6.69E+00 | µg/m³ | 5.46E-03 | µg/m³ | -- | -- | -- | 3.82E-01 | µg/m³ | 2.00E+03 | µg/m³ | 0.0002 |

Table 7-2.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,3-Dichlorobenzene | 1.07E+01 | µg/m³ | 8.73E-03 | µg/m³ | -- | -- | -- | 6.11E-01 | µg/m³ | 2.00E+03 | µg/m³ | 0.0003 |
| | | | | 1,4-Dichlorobenzene | 8.08E+00 | µg/m³ | 6.59E-03 | µg/m³ | 1.10E-05 | m³/µg | 7E-08 | 4.61E-01 | µg/m³ | 1.20E+03 | µg/m³ | 0.0004 |
| | | | | 2-Hexanone | 3.32E+01 | µg/m³ | 2.71E-02 | µg/m³ | -- | -- | -- | 1.90E+00 | µg/m³ | 3.00E+01 | µg/m³ | 0.06 |
| | | | | Bromodichloromethane | 5.36E+00 | µg/m³ | 4.37E-03 | µg/m³ | 3.70E-05 | m³/µg | 2E-07 | 3.06E-01 | µg/m³ | 2.00E+01 | µg/m³ | 0.02 |
| | | | | Bromoform | 1.30E+01 | µg/m³ | 1.06E-02 | µg/m³ | 1.10E-06 | m³/µg | 1E-08 | 7.40E-01 | µg/m³ | -- | -- | -- |
| | | | | Bromomethane | 1.61E+01 | µg/m³ | 1.32E-02 | µg/m³ | -- | -- | -- | 9.21E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.009 |
| | | | | Carbon Tetrachloride | 9.75E+00 | µg/m³ | 7.95E-03 | µg/m³ | 6.00E-06 | m³/µg | 5E-08 | 5.56E-01 | µg/m³ | 1.89E+02 | µg/m³ | 0.003 |
| | | | | Chlorobenzene | 8.53E+00 | µg/m³ | 6.95E-03 | µg/m³ | -- | -- | -- | 4.87E-01 | µg/m³ | 5.00E+02 | µg/m³ | 0.001 |
| | | | | Chloromethane | 2.04E+01 | µg/m³ | 1.66E-02 | µg/m³ | 1.80E-06 | m³/µg | 3E-08 | 1.17E+00 | µg/m³ | 3.00E+03 | µg/m³ | 0.0004 |
| | | | | cis-1,3-Dichloropropene | 5.93E+00 | µg/m³ | 4.83E-03 | µg/m³ | 4.00E-06 | m³/µg | 2E-08 | 3.38E-01 | µg/m³ | 3.63E+01 | µg/m³ | 0.009 |
| | | | | Dibromochloromethane | 7.60E+00 | µg/m³ | 6.19E-03 | µg/m³ | -- | -- | -- | 4.34E-01 | µg/m³ | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 3.80E+01 | µg/m³ | 3.10E-02 | µg/m³ | -- | -- | -- | 2.17E+00 | µg/m³ | 1.00E+03 | µg/m³ | 0.002 |
| | | | | Hexachlorobutadiene | 1.13E+00 | µg/m³ | 9.22E-04 | µg/m³ | 2.20E-05 | m³/µg | 2E-08 | 6.45E-02 | µg/m³ | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.25E+01 | µg/m³ | 1.02E-02 | µg/m³ | 2.60E-07 | m³/µg | 3E-09 | 7.14E-01 | µg/m³ | 2.52E+03 | µg/m³ | 0.0003 |
| | | | | Methylene Chloride | 1.19E+01 | µg/m³ | 9.71E-03 | µg/m³ | 1.00E-08 | m³/µg | 1E-10 | 6.80E-01 | µg/m³ | 1.04E+03 | µg/m³ | 0.0007 |
| | | | | trans-1,2-Dichloroethene | 1.77E+01 | µg/m³ | 1.44E-02 | µg/m³ | -- | -- | -- | 1.01E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.003 |
| | | | | trans-1,3-Dichloropropene | 7.90E+00 | µg/m³ | 6.44E-03 | µg/m³ | 4.00E-06 | m³/µg | 3E-08 | 4.51E-01 | µg/m³ | 3.63E+01 | µg/m³ | 0.01 |
| | | | | Vinyl Chloride | 2.66E-04 | µg/m³ | 2.17E-07 | µg/m³ | 4.40E-06 | m³/µg | 1E-12 | 1.52E-05 | µg/m³ | 8.00E+01 | µg/m³ | 0.0000002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 5.72E-01 | µg/m³ | 4.67E-04 | µg/m³ | 3.30E-04 | m³/µg | 2E-07 | 3.27E-02 | µg/m³ | 1.17E+02 | µg/m³ | 0.0003 |
| | | | | Hexachlorobenzene | 2.10E+00 | µg/m³ | 1.71E-03 | µg/m³ | 4.60E-04 | m³/µg | 8E-07 | 1.20E-01 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 9.09E+00 | µg/m³ | 7.41E-03 | µg/m³ | -- | -- | -- | 5.19E-01 | µg/m³ | 1.12E+02 | µg/m³ | 0.005 |
| | | | | Hexachloroethane | 1.18E+00 | µg/m³ | 9.61E-04 | µg/m³ | 1.10E-05 | m³/µg | 1E-08 | 6.73E-02 | µg/m³ | 5.81E+04 | µg/m³ | 0.000001 |
| | | | | Nitrobenzene | 7.92E-01 | µg/m³ | 6.46E-04 | µg/m³ | 4.00E-05 | m³/µg | 3E-08 | 4.52E-02 | µg/m³ | 2.00E+01 | µg/m³ | 0.002 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 6.32E-03 | µg/m³ | 5.15E-06 | µg/m³ | 4.90E-03 | m³/µg | 3E-08 | 3.61E-04 | µg/m³ | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.30E-06 | µg/m³ | 1.88E-09 | µg/m³ | 5.71E-04 | m³/µg | 1E-12 | 1.31E-07 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1232 | 1.10E+00 | µg/m³ | 8.98E-04 | µg/m³ | 5.71E-04 | m³/µg | 5E-07 | 6.29E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1242 | 4.20E-01 | µg/m³ | 3.42E-04 | µg/m³ | 5.71E-04 | m³/µg | 2E-07 | 2.40E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1248 | 4.03E-01 | µg/m³ | 3.29E-04 | µg/m³ | 5.71E-04 | m³/µg | 2E-07 | 2.30E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1254 | 2.70E-01 | µg/m³ | 2.20E-04 | µg/m³ | 5.71E-04 | m³/µg | 1E-07 | 1.54E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1260 | 2.77E-01 | µg/m³ | 2.26E-04 | µg/m³ | 5.71E-04 | m³/µg | 1E-07 | 1.58E-02 | µg/m³ | -- | -- | -- |
| | | | | Cyanide | 5.27E+01 | µg/m³ | 4.30E-02 | µg/m³ | -- | -- | -- | 3.01E+00 | µg/m³ | 8.00E-01 | µg/m³ | 4 |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | 6 |
| | | Exp. Point Total | | | | | | | | | 1E-04 | | | | | 6 |
| | Exp. Medium Total | | | | | | | | | | 1E-04 | | | | | 6 |
| Medium Total | | | | | | | | | | | 1E-04 | | | | | 6 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 1E-04 | | | | Total of Receptor Hazards Across All Media | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-3.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.15E-05 | mg/kg-day | 1.00E-05 | mg/kg-day | 1 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 1 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.73E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.03 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 1 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | (2) | -- | -- | -- | -- | 6.35E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 1 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.99E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.01 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 1.22E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.03 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 5.73E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0003 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 8.23E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.02E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.01 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.74E-04 | mg/kg-day | 2.00E-04 | mg/kg-day | 1 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.30E-04 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.01 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.98E-05 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0006 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.98E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.004 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.98E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0009 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.24E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.06 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 4.24E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 1.35E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.007 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 9.47E-05 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.07 |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.23E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.02 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.48E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 8.73E-05 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 3.74E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.001 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 6.98E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.49E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.001 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 7.73E-05 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 6.73E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.05E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.005 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.23E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.02 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 3.49E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.03 |

Table 7-3.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 8.98E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.04 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.74E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.74E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.09 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.5 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.48E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.12E-04 | mg/kg-day | 8.00E-05 | mg/kg-day | 1 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 4.49E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.01 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.48E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.5 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.0003 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 1.67E-05 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.12E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.006 |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.12E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0006 |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | (2) | -- | -- | -- | -- | 1.47E-05 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 2.19E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.03 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 8.98E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.02 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | (2) | -- | -- | -- | -- | 1.97E-05 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 2.19E-05 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 1.77E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.009 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 5.24E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | (2) | -- | -- | -- | -- | 9.22E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 1.30E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 1.07E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | (2) | -- | -- | -- | -- | 4.49E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | (2) | -- | -- | -- | -- | 4.24E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.99E-06 | mg/kg-day | 2.00E-05 | mg/kg-day | 0.1 |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | (2) | -- | -- | -- | -- | 3.24E-06 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.49E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.4 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.20E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.82E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 3.94E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 9.67E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.25E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.01 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 4.63E-05 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.2 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 6.50E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0007 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.02E-06 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.08E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0003 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.93E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.76E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0005 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.18E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.63E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 8.67E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0004 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 2.67E-06 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.002 |

Table 7-3.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 1.71E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.004 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.72E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0009 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 2.20E-06 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 3.43E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0001 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 4.15E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0002 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.62E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0001 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.31E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 1.55E-06 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 2.21E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0004 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.16E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.57E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 4.87E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.32E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 2.96E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.001 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.47E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0007 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.76E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.80E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.005 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.93E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.81E-06 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.09 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.66E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.30E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.28E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.005 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.24E-06 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.00004 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 4.02E-07 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.57E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0008 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 2.60E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.04 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.13E-05 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.02 |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 6.36E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 1.14E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0006 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.79E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.04 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 3.95E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 3.27E-05 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.70E-06 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.5 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 5 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 5 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 5 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 7 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-4.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.08E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.1 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.1 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.55E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.005 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.1 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.1 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | (2) | -- | -- | -- | -- | 6.35E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.1 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.20E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.006 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.34E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.02 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 3.45E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0002 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 4.94E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 6.14E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.006 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.65E-04 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.8 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.79E-05 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.009 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.60E-05 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.0009 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0003 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.79E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.60E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0005 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.95E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.04 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.55E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 8.09E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.004 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 5.69E-05 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.04 |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.01 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 5.24E-05 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.25E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0007 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 4.20E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.50E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0007 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.007 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 4.64E-05 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 4.05E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.007 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 6.29E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.001 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.01 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.10E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |

Table 7-4.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 5.39E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.03 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.65E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.008 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.65E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.05 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.3 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.74E-05 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.8 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.70E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.007 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.3 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.0002 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 1.00E-05 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.74E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.74E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0003 |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | (2) | -- | -- | -- | -- | 8.84E-06 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 1.32E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.02 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 5.39E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.009 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.009 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | (2) | -- | -- | -- | -- | 1.18E-05 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 1.32E-05 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 1.06E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.005 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 3.15E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.006 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | (2) | -- | -- | -- | -- | 5.54E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 7.79E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 6.44E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.70E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | (2) | -- | -- | -- | -- | 2.55E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | (2) | -- | -- | -- | -- | 1.80E-06 | mg/kg-day | 2.00E-05 | mg/kg-day | 0.09 |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | (2) | -- | -- | -- | -- | 1.95E-06 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.50E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.2 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.46E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0007 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 5.19E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 2.61E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 6.42E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 8.28E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.008 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.08E-05 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.2 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.32E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0005 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.33E-06 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00008 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.05E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0002 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 3.28E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.49E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0004 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 7.83E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.75E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00009 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 5.76E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0003 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 1.77E-06 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.001 |

Table 7-4.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 1.13E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.14E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 1.50E-06 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.28E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.00008 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 2.76E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.74E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00009 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.53E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 1.03E-06 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 1.47E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0002 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 7.68E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0004 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.03E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0001 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 3.36E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.54E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 1.96E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.001 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 9.75E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0005 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.17E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.19E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.003 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.28E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 4.52E-06 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.06 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 4.42E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0001 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.62E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.50E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.004 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 8.24E-07 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.00002 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 2.67E-07 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.04E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0005 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 1.72E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.03 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 7.47E-06 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.01 |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 4.22E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 7.56E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0004 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.19E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.02 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 2.62E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 2.17E-05 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.18E-06 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 3 |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.92E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.53E-03 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 1.60E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.11E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.01 |
| | | | | 1,1-Dichloroethane | 1.01E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.32E-03 | µg/m³ | 5.00E+02 | µg/m³ | 0.000003 |
| | | | | 1,1-Dichloroethene | 1.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.96E-03 | µg/m³ | 2.00E+02 | µg/m³ | 0.00001 |
| | | | | 1,2,4-Trichlorobenzene | 1.29E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.70E-03 | µg/m³ | 2.00E+00 | µg/m³ | 0.0008 |
| | | | | 1,2-Dibromo-3-chloropropane | 1.47E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.94E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.01 |
| | | | | 1,2-Dibromoethane | 1.40E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.85E-03 | µg/m³ | 9.00E+00 | µg/m³ | 0.0002 |
| | | | | 1,2-Dichloropropane | 9.68E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.27E-03 | µg/m³ | 4.00E+00 | µg/m³ | 0.0003 |
| | | | | 1,2-Dichlorobenzene | 7.07E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.31E-04 | µg/m³ | 2.00E+02 | µg/m³ | 0.000005 |

Table 7-4.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,3-Dichlorobenzene | 1.13E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.49E-03 | µg/m³ | 2.00E+02 | µg/m³ | 0.000007 |
| | | | | 1,4-Dichlorobenzene | 8.64E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.14E-03 | µg/m³ | 8.00E+02 | µg/m³ | 0.000001 |
| | | | | 2-Hexanone | 1.94E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.56E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00009 |
| | | | | Bromodichloromethane | 5.80E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.64E-04 | µg/m³ | -- | -- | -- |
| | | | | Bromoform | 1.22E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.61E-03 | µg/m³ | -- | -- | -- |
| | | | | Bromomethane | 1.70E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.24E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0004 |
| | | | | Carbon Tetrachloride | 1.10E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.45E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00001 |
| | | | | Chlorobenzene | 8.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.18E-03 | µg/m³ | 5.00E+01 | µg/m³ | 0.00002 |
| | | | | Chloromethane | 1.95E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.57E-03 | µg/m³ | 9.00E+01 | µg/m³ | 0.00003 |
| | | | | cis-1,3-Dichloropropene | 6.17E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.12E-04 | µg/m³ | 2.00E+01 | µg/m³ | 0.00004 |
| | | | | Dibromochloromethane | 7.54E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.93E-04 | µg/m³ | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 4.19E-01 | µg/m³ | (2) | -- | -- | -- | -- | 5.52E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00006 |
| | | | | Hexachlorobutadiene | 1.33E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.76E-04 | µg/m³ | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.12E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.47E-03 | µg/m³ | 3.00E+03 | µg/m³ | 0.0000005 |
| | | | | Methylene Chloride | 1.22E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.61E-03 | µg/m³ | 6.00E+02 | µg/m³ | 0.000003 |
| | | | | trans-1,2-Dichloroethene | 1.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.47E-03 | µg/m³ | 4.00E+01 | µg/m³ | 0.00006 |
| | | | | trans-1,3-Dichloropropene | 8.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.08E-03 | µg/m³ | 2.00E+01 | µg/m³ | 0.00005 |
| | | | | Vinyl Chloride | 1.53E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.01E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 2.09E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.76E-05 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorobenzene | 2.34E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.08E-04 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.08E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.43E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.007 |
| | | | | Hexachloroethane | 1.34E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.77E-04 | µg/m³ | 3.00E+01 | µg/m³ | 0.000006 |
| | | | | Nitrobenzene | 3.27E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.30E-05 | µg/m³ | 9.00E+00 | µg/m³ | 0.000005 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 2.22E-07 | µg/m³ | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 9.73E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.28E-04 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1232 | 1.19E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.57E-04 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1242 | 3.29E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.34E-05 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1248 | 3.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.47E-05 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1254 | 1.93E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.54E-05 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1260 | 2.06E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.71E-05 | µg/m³ | -- | -- | -- |
| | | | | Cyanide | 2.86E-01 | µg/m³ | (2) | -- | -- | -- | -- | 3.76E-03 | µg/m³ | 8.00E-01 | µg/m³ | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | | | | | -- | | | | | 3 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 3 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-5.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 1.29E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 3.64E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | 2.36E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | -- |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 5.13E-05 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 3.14E-05 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 1.48E-05 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 2.12E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 2.63E-05 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 2.20E-04 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 3.34E-05 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 1.54E-05 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 2.05E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 1.54E-05 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 8.34E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 1.09E-05 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Bromoform | 2.70E-03 | mg/L | 3.47E-05 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Bromomethane | 1.90E-03 | mg/L | 2.44E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 1.86E-05 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 1.41E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chloromethane | 1.75E-03 | mg/L | 2.25E-05 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 9.63E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 1.80E-05 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 6.42E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 1.99E-05 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 5.39E-05 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 2.70E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 9.40E-05 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 7E-05 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 8.98E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |

Table 7-5.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 2.31E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-06 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 1.41E-05 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 2.89E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 1.16E-05 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 1.41E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Atrazine | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 4.30E-06 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | 2.89E-05 | mg/kg-day | 1.40E-02 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 2.89E-05 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | 1.18E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | 5.65E-06 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 9E-06 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 2.31E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | 1.58E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 5.65E-06 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 4E-05 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 4.56E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 1.35E-05 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | 2.37E-08 | mg/kg-day | 1.70E+01 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 3.34E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 2.76E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | 1.16E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | 1.09E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | 7.70E-07 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | 8.34E-07 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 6.42E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 6.14E-06 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 2.19E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 1.10E-06 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 6E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 2.71E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 3.49E-05 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 4.07E-05 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 1.82E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 1.40E-06 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 8.63E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 1.38E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 1.05E-05 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 3.30E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 7.37E-07 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Bromoform | 2.70E-03 | mg/L | 2.43E-06 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Bromomethane | 1.90E-03 | mg/L | 7.46E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-5.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 4.78E-06 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 4.81E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chloromethane | 1.75E-03 | mg/L | 6.29E-07 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 9.59E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 1.16E-06 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 7.32E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 6.46E-06 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 4.33E-07 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 8E-10 | (2) | -- | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 1.94E-06 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 3.24E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 1.28E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 7.27E-06 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 6.49E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 8.27E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 4.11E-07 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 4.94E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 1.34E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 5.40E-06 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 1.91E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 1.86E-07 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 3.63E-07 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 1.48E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Atrazine | 2.20E-04 | mg/L | 3.47E-07 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 1.12E-07 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 4.38E-05 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 7.26E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 3.15E-06 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 1.78E-07 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 3.19E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 5.01E-05 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 1.11E-05 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 9.14E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 4.93E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 6E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 6E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.92E-01 | µg/m³ | 7.22E-04 | µg/m³ | 5.80E-05 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 1.60E-01 | µg/m³ | 6.04E-04 | µg/m³ | 1.60E-05 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethane | 1.01E-01 | µg/m³ | 3.78E-04 | µg/m³ | 1.60E-06 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethene | 1.49E-01 | µg/m³ | 5.61E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 1.29E-01 | µg/m³ | 4.85E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 1.47E-01 | µg/m³ | 1.45E-01 | µg/m³ | 6.00E-03 | m³/µg | 9E-04 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 1.40E-01 | µg/m³ | 5.28E-04 | µg/m³ | 6.00E-04 | m³/µg | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloropropane | 9.68E-02 | µg/m³ | 3.64E-04 | µg/m³ | 3.70E-06 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichlorobenzene | 7.07E-02 | µg/m³ | 2.66E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-5.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,3-Dichlorobenzene | 1.13E-01 | µg/m³ | 4.25E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,4-Dichlorobenzene | 8.64E-02 | µg/m³ | 3.25E-04 | µg/m³ | 1.10E-05 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 1.94E-01 | µg/m³ | 7.31E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 5.80E-02 | µg/m³ | 2.18E-04 | µg/m³ | 3.70E-05 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Bromoform | 1.22E-01 | µg/m³ | 4.59E-04 | µg/m³ | 1.10E-06 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Bromomethane | 1.70E-01 | µg/m³ | 6.39E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Carbon Tetrachloride | 1.10E-01 | µg/m³ | 4.14E-04 | µg/m³ | 6.00E-06 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Chlorobenzene | 8.93E-02 | µg/m³ | 3.36E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chloromethane | 1.95E-01 | µg/m³ | 7.35E-04 | µg/m³ | 1.80E-06 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 6.17E-02 | µg/m³ | 2.32E-04 | µg/m³ | 4.00E-06 | m³/µg | 9E-10 | (2) | -- | -- | -- | -- |
| | | | | Dibromochloromethane | 7.54E-02 | µg/m³ | 2.84E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 4.19E-01 | µg/m³ | 1.58E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 1.33E-02 | µg/m³ | 5.02E-05 | µg/m³ | 2.20E-05 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.12E-01 | µg/m³ | 4.20E-04 | µg/m³ | 2.60E-07 | m³/µg | 1E-10 | (2) | -- | -- | -- | -- |
| | | | | Methylene Chloride | 1.22E-01 | µg/m³ | 1.20E-01 | µg/m³ | 1.00E-08 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | trans-1,2-Dichloroethene | 1.87E-01 | µg/m³ | 7.05E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | trans-1,3-Dichloropropene | 8.22E-02 | µg/m³ | 3.09E-04 | µg/m³ | 4.00E-06 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.53E-01 | µg/m³ | 2.07E-01 | µg/m³ | 4.40E-06 | m³/µg | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 2.09E-03 | µg/m³ | 7.88E-06 | µg/m³ | 3.30E-04 | m³/µg | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 2.34E-02 | µg/m³ | 8.79E-05 | µg/m³ | 4.60E-04 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.08E-01 | µg/m³ | 4.08E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 1.34E-02 | µg/m³ | 5.06E-05 | µg/m³ | 1.10E-05 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 3.27E-03 | µg/m³ | 1.23E-05 | µg/m³ | 4.00E-05 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.69E-05 | µg/m³ | 6.36E-08 | µg/m³ | 4.90E-03 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 9.73E-03 | µg/m³ | 3.66E-05 | µg/m³ | 5.71E-04 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1232 | 1.19E-02 | µg/m³ | 4.48E-05 | µg/m³ | 5.71E-04 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1242 | 3.29E-03 | µg/m³ | 1.24E-05 | µg/m³ | 5.71E-04 | m³/µg | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1248 | 3.40E-03 | µg/m³ | 1.28E-05 | µg/m³ | 5.71E-04 | m³/µg | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1254 | 1.93E-03 | µg/m³ | 7.26E-06 | µg/m³ | 5.71E-04 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1260 | 2.06E-03 | µg/m³ | 7.74E-06 | µg/m³ | 5.71E-04 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 2.86E-01 | µg/m³ | 1.08E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | | | | | 1E-03 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | 1E-03 | | | Total of Receptor Hazards Across All Media | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-6.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 2.14E-07 | mg/kg-day | -- | -- | -- | 5.99E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.06 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.06 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 9.06E-09 | mg/kg-day | -- | -- | -- | 2.54E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.06 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.06 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | 4.20E-08 | µg/m³ | -- | -- | -- | 1.18E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.06 |
| Groundwater | Outdoor Air | Outdoor Air | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.84E-05 | µg/m³ | 1.50E-06 | µg/m³ | 5.80E-05 | m³/µg | 9E-11 | 4.20E-06 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.32E-05 | µg/m³ | 1.89E-06 | µg/m³ | 1.60E-05 | m³/µg | 3E-11 | 5.29E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00003 |
| | | | | 1,1-Dichloroethane | 2.64E-05 | µg/m³ | 2.15E-06 | µg/m³ | 1.60E-06 | m³/µg | 3E-12 | 6.02E-06 | µg/m³ | 5.00E+02 | µg/m³ | 0.00000001 |
| | | | | 1,1-Dichloroethene | 1.14E-04 | µg/m³ | 9.26E-06 | µg/m³ | -- | -- | -- | 2.59E-05 | µg/m³ | 2.00E+02 | µg/m³ | 0.0000001 |
| | | | | 1,2,4-Trichlorobenzene | 1.56E-05 | µg/m³ | 1.28E-06 | µg/m³ | -- | -- | -- | 3.57E-06 | µg/m³ | 2.00E+00 | µg/m³ | 0.000002 |
| | | | | 1,2-Dibromo-3-chloropropane | 8.86E-06 | µg/m³ | 7.22E-07 | µg/m³ | 6.00E-03 | m³/µg | 4E-09 | 2.02E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00001 |
| | | | | 1,2-Dibromoethane | 1.71E-05 | µg/m³ | 1.40E-06 | µg/m³ | 6.00E-04 | m³/µg | 8E-10 | 3.91E-06 | µg/m³ | 9.00E+00 | µg/m³ | 0.0000004 |
| | | | | 1,2-Dichloropropane | 1.77E-05 | µg/m³ | 1.45E-06 | µg/m³ | 3.70E-06 | m³/µg | 5E-12 | 4.05E-06 | µg/m³ | 4.00E+00 | µg/m³ | 0.000001 |
| | | | | 1,2-Dichlorobenzene | 1.04E-05 | µg/m³ | 8.49E-07 | µg/m³ | -- | -- | -- | 2.38E-06 | µg/m³ | 2.00E+02 | µg/m³ | 0.00000001 |
| | | | | 1,3-Dichlorobenzene | 1.67E-05 | µg/m³ | 1.36E-06 | µg/m³ | -- | -- | -- | 3.82E-06 | µg/m³ | 2.00E+02 | µg/m³ | 0.00000002 |
| | | | | 1,4-Dichlorobenzene | 1.34E-05 | µg/m³ | 1.09E-06 | µg/m³ | 1.10E-05 | m³/µg | 1E-11 | 3.06E-06 | µg/m³ | 8.00E+02 | µg/m³ | 4E-09 |
| | | | | 2-Hexanone | 1.49E-05 | µg/m³ | 1.22E-06 | µg/m³ | -- | -- | -- | 3.41E-06 | µg/m³ | 3.00E+01 | µg/m³ | 0.0000001 |
| | | | | Bromodichloromethane | 9.91E-06 | µg/m³ | 8.08E-07 | µg/m³ | 3.70E-05 | m³/µg | 3E-11 | 2.26E-06 | µg/m³ | -- | -- | -- |
| | | | | Bromoform | 1.38E-05 | µg/m³ | 1.13E-06 | µg/m³ | 1.10E-06 | m³/µg | 1E-12 | 3.16E-06 | µg/m³ | -- | -- | -- |
| | | | | Bromomethane | 5.96E-05 | µg/m³ | 4.86E-06 | µg/m³ | -- | -- | -- | 1.36E-05 | µg/m³ | 5.00E+00 | µg/m³ | 0.000003 |
| | | | | Carbon Tetrachloride | 7.48E-05 | µg/m³ | 6.10E-06 | µg/m³ | 6.00E-06 | m³/µg | 4E-11 | 1.71E-05 | µg/m³ | 1.00E+02 | µg/m³ | 0.0000002 |
| | | | | Chlorobenzene | 1.73E-05 | µg/m³ | 1.41E-06 | µg/m³ | -- | -- | -- | 3.96E-06 | µg/m³ | 5.00E+01 | µg/m³ | 0.00000008 |
| | | | | Chloromethane | 7.94E-05 | µg/m³ | 6.47E-06 | µg/m³ | 1.80E-06 | m³/µg | 1E-11 | 1.81E-05 | µg/m³ | 9.00E+01 | µg/m³ | 0.0000002 |
| | | | | cis-1,3-Dichloropropene | 3.07E-05 | µg/m³ | 2.50E-06 | µg/m³ | 4.00E-06 | m³/µg | 1E-11 | 7.01E-06 | µg/m³ | 2.00E+01 | µg/m³ | 0.0000004 |
| | | | | Dibromochloromethane | 1.03E-05 | µg/m³ | 8.42E-07 | µg/m³ | -- | -- | -- | 2.36E-06 | µg/m³ | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 3.01E-03 | µg/m³ | 2.45E-04 | µg/m³ | -- | -- | -- | 6.87E-04 | µg/m³ | 1.00E+02 | µg/m³ | 0.000007 |
| | | | | Hexachlorobutadiene | 2.51E-06 | µg/m³ | 2.05E-07 | µg/m³ | 2.20E-05 | m³/µg | 5E-12 | 5.74E-07 | µg/m³ | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.23E-05 | µg/m³ | 1.00E-06 | µg/m³ | 2.60E-07 | m³/µg | 3E-13 | 2.81E-06 | µg/m³ | 3.00E+03 | µg/m³ | 9E-10 |
| | | | | Methylene Chloride | 2.47E-05 | µg/m³ | 2.01E-06 | µg/m³ | 1.00E-08 | m³/µg | 2E-14 | 5.63E-06 | µg/m³ | 6.00E+02 | µg/m³ | 9E-09 |
| | | | | trans-1,2-Dichloroethene | 6.82E-05 | µg/m³ | 5.56E-06 | µg/m³ | -- | -- | -- | 1.56E-05 | µg/m³ | 4.00E+01 | µg/m³ | 0.0000004 |
| | | | | trans-1,3-Dichloropropene | 4.09E-05 | µg/m³ | 3.34E-06 | µg/m³ | 4.00E-06 | m³/µg | 1E-11 | 9.34E-06 | µg/m³ | 2.00E+01 | µg/m³ | 0.0000005 |
| | | | | Vinyl Chloride | 1.33E-04 | µg/m³ | 1.09E-05 | µg/m³ | 4.40E-06 | m³/µg | 5E-11 | 3.04E-05 | µg/m³ | 1.00E+02 | µg/m³ | 0.0000003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 1.26E-07 | µg/m³ | 1.03E-08 | µg/m³ | 3.30E-04 | m³/µg | 3E-12 | 2.88E-08 | µg/m³ | -- | -- | -- |

Table 7-6.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Hexachlorobenzene | 2.29E-06 | µg/m³ | 1.87E-07 | µg/m³ | 4.60E-04 | m³/µg | 9E-11 | 5.22E-07 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 3.68E-05 | µg/m³ | 3.00E-06 | µg/m³ | -- | -- | -- | 8.40E-06 | µg/m³ | 2.00E-01 | µg/m³ | 0.00004 |
| | | | | Hexachloroethane | 2.41E-06 | µg/m³ | 1.97E-07 | µg/m³ | 1.10E-05 | m³/µg | 2E-12 | 5.51E-07 | µg/m³ | 3.00E+01 | µg/m³ | 0.00000002 |
| | | | | Nitrobenzene | 2.11E-07 | µg/m³ | 1.72E-08 | µg/m³ | 4.00E-05 | m³/µg | 7E-13 | 4.81E-08 | µg/m³ | 9.00E+00 | µg/m³ | 5E-09 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.59E-09 | µg/m³ | 1.30E-10 | µg/m³ | 4.90E-03 | m³/µg | 6E-13 | 3.64E-10 | µg/m³ | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 1.15E-06 | µg/m³ | 9.39E-08 | µg/m³ | 5.71E-04 | m³/µg | 5E-11 | 2.63E-07 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1232 | 9.69E-07 | µg/m³ | 7.90E-08 | µg/m³ | 5.71E-04 | m³/µg | 5E-11 | 2.21E-07 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1242 | 2.34E-07 | µg/m³ | 1.91E-08 | µg/m³ | 5.71E-04 | m³/µg | 1E-11 | 5.34E-08 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1248 | 6.32E-08 | µg/m³ | 5.15E-09 | µg/m³ | 5.71E-04 | m³/µg | 3E-12 | 1.44E-08 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1254 | 3.24E-07 | µg/m³ | 2.64E-08 | µg/m³ | 5.71E-04 | m³/µg | 2E-11 | 7.40E-08 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1260 | 4.43E-07 | µg/m³ | 3.62E-08 | µg/m³ | 5.71E-04 | m³/µg | 2E-11 | 1.01E-07 | µg/m³ | -- | -- | -- |
| | | | | Cyanide | 3.66E-05 | µg/m³ | 2.99E-06 | µg/m³ | -- | -- | -- | 8.36E-06 | µg/m³ | 8.00E-01 | µg/m³ | 0.00001 |
| | | | Exp. Route Total | | | | | | | | 6E-09 | | | | | 0.0001 |
| | | Exp. Point Total | | | | | | | | | 6E-09 | | | | | 0.0001 |
| | Exp. Medium Total | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 6E-09 | | | | | 0.06 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-7.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 2.83E-08 | mg/kg-day | -- | -- | -- | 1.98E-06 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.05 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 9.06E-10 | mg/kg-day | -- | -- | -- | 6.34E-08 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.59E-05 | µg/m³ | 2.15E-07 | µg/m³ | -- | -- | -- | 1.51E-05 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.05 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 5.14E-09 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-09 | 3.60E-07 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.000007 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 3.15E-09 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-10 | 2.20E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.00006 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 1.48E-09 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 8E-12 | 1.03E-07 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.00000005 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 2.12E-09 | mg/kg-day | -- | -- | -- | 1.48E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 2.63E-09 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 8E-11 | 1.84E-07 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.000002 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 7.06E-09 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 6E-09 | 4.94E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0002 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 3.34E-09 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-09 | 2.34E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00003 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 1.54E-09 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 6E-12 | 1.08E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.000003 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | -- | -- | -- | 8.99E-08 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.0000001 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 2.05E-09 | mg/kg-day | -- | -- | -- | 1.44E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 1.54E-09 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 8E-12 | 1.08E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000002 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 8.35E-09 | mg/kg-day | -- | -- | -- | 5.84E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0001 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 1.09E-09 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 7E-11 | 7.64E-08 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00001 |
| | | | | Bromoform | 2.70E-03 | mg/L | 3.47E-09 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 3E-11 | 2.43E-07 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.000008 |
| | | | | Bromomethane | 1.90E-03 | mg/L | 2.44E-09 | mg/kg-day | -- | -- | -- | 1.71E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00003 |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 1.86E-09 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 1E-10 | 1.30E-07 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.00002 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 1.41E-09 | mg/kg-day | -- | -- | -- | 9.89E-08 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000001 |
| | | | | Chloromethane | 1.75E-03 | mg/L | 2.25E-09 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 3E-11 | 1.57E-07 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 9.63E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-10 | 6.74E-08 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.000002 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 1.80E-09 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 2E-10 | 1.26E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000002 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 6.42E-09 | mg/kg-day | -- | -- | -- | 4.49E-07 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.000009 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 2E-11 | 1.98E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00002 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 1.99E-09 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 4E-12 | 1.39E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0000005 |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 1.73E-09 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 3E-12 | 1.21E-07 | mg/kg-day | 6.00E-02 | mg/kg-day | 0.000002 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 2.70E-09 | mg/kg-day | -- | -- | -- | 1.89E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0000009 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-10 | 8.99E-08 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.000002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 1.86E-09 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 1E-09 | 1.30E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 8.99E-10 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-11 | 6.29E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00006 |

Table 7-7.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 2.31E-09 | mg/kg-day | -- | -- | -- | 1.62E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000008 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-10 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-10 | 4.94E-08 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.000007 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-10 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-09 | 4.94E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000005 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 1.28E-09 | mg/kg-day | -- | -- | -- | 8.99E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.0009 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 1.41E-09 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 6E-10 | 9.89E-08 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 2.89E-09 | mg/kg-day | -- | -- | -- | 2.02E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0003 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 6E-11 | 1.98E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00004 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 1.16E-09 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 2E-11 | 8.09E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000008 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 1.41E-09 | mg/kg-day | -- | -- | -- | 9.89E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.001 |
| | | | | Atrazine | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 6E-11 | 1.98E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000007 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 4.30E-10 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 5E-10 | 3.01E-08 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | 2.89E-09 | mg/kg-day | 1.40E-02 | 1/(mg/kg-day) | 4E-11 | 2.02E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000002 |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 2.89E-09 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 5E-12 | 2.02E-07 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.0000001 |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | 3.79E-10 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-10 | 2.65E-08 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | 5.65E-10 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 9E-10 | 3.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 2.31E-09 | mg/kg-day | -- | -- | -- | 1.62E-07 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.000002 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 2.83E-10 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 1E-11 | 1.98E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000002 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | 5.07E-10 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 5E-11 | 3.55E-08 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 5.65E-10 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 4E-09 | 3.96E-08 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 4.56E-10 | mg/kg-day | -- | -- | -- | 3.19E-08 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.000006 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 1.35E-09 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 5E-10 | 9.44E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00009 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | 2.38E-12 | mg/kg-day | 1.70E+01 | 1/(mg/kg-day) | 4E-11 | 1.66E-10 | mg/kg-day | 4.00E-05 | mg/kg-day | 0.000004 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 3.34E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-10 | 2.34E-08 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 2.76E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 6E-10 | 1.93E-08 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | 1.16E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 8.09E-09 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | 1.09E-10 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 7.64E-09 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | 7.71E-11 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 5.39E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0002 |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | 8.35E-11 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-10 | 5.84E-09 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 6.42E-09 | mg/kg-day | -- | -- | -- | 4.49E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 3E-08 | | | | | 0.007 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 3.45E-08 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 7E-09 | 2.41E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.00005 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 1.36E-08 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 8E-10 | 9.53E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 7.82E-09 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 4E-11 | 5.48E-07 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.0000003 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 1.91E-08 | mg/kg-day | -- | -- | -- | 1.34E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 1.82E-07 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 5E-09 | 1.28E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 6.68E-08 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 5E-08 | 4.68E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.002 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 9.90E-09 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-08 | 6.93E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00008 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 9.38E-09 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 3E-11 | 6.56E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00002 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 4.80E-08 | mg/kg-day | -- | -- | -- | 3.36E-06 | mg/kg-day | 6.00E-01 | mg/kg-day | 0.000006 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 7.69E-08 | mg/kg-day | -- | -- | -- | 5.38E-06 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.00008 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 5.85E-08 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 3E-10 | 4.09E-06 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.00006 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 2.35E-08 | mg/kg-day | -- | -- | -- | 1.65E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0003 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 4.20E-09 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 3E-10 | 2.94E-07 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00004 |
| | | | | Bromoform | 2.70E-03 | mg/L | 1.25E-08 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 1E-10 | 8.76E-07 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.00003 |
| | | | | Bromomethane | 1.90E-03 | mg/L | 5.45E-09 | mg/kg-day | -- | -- | -- | 3.81E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00008 |

Table 7-7.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 2.73E-08 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 2E-09 | 1.91E-06 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.0003 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 3.07E-08 | mg/kg-day | -- | -- | -- | 2.15E-06 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.00003 |
| | | | | Chloromethane | 1.75E-03 | mg/L | 5.41E-09 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 7E-11 | 3.79E-07 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 6.45E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 6E-10 | 4.51E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00001 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 6.17E-09 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 5E-10 | 4.32E-07 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.000006 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 4.72E-08 | mg/kg-day | -- | -- | -- | 3.31E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.00007 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 3.33E-08 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 3E-09 | 2.33E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 3.27E-09 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 6E-12 | 2.29E-07 | mg/kg-day | 3.00E-01 | mg/kg-day | 0.0000008 |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 4.73E-09 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 9E-12 | 3.31E-07 | mg/kg-day | 6.00E-02 | mg/kg-day | 0.000006 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 2.29E-08 | mg/kg-day | -- | -- | -- | 1.61E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000008 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 8.60E-09 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 9E-10 | 6.02E-07 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 1.15E-08 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 8E-09 | 8.04E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 3.42E-08 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 4E-10 | 2.39E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 4.53E-09 | mg/kg-day | -- | -- | -- | 3.17E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 2.26E-09 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 7E-10 | 1.58E-07 | mg/kg-day | 7.00E-03 | mg/kg-day | 0.00002 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 2.71E-09 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-09 | 1.90E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00002 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 7.21E-10 | mg/kg-day | -- | -- | -- | 5.05E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.0005 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 2.78E-08 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 1E-08 | 1.95E-06 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 1.02E-08 | mg/kg-day | -- | -- | -- | 7.15E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0009 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 1.18E-09 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 2E-10 | 8.29E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0002 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 2.24E-09 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 4E-11 | 1.57E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00002 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 7.93E-10 | mg/kg-day | -- | -- | -- | 5.55E-08 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.0006 |
| | | | | Atrazine | 2.20E-04 | mg/L | 1.79E-09 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 4E-10 | 1.25E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00004 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 6.83E-10 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 8E-10 | 4.78E-08 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 2.26E-07 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 4E-10 | 1.58E-05 | mg/kg-day | 2.00E+00 | mg/kg-day | 0.000008 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 3.74E-07 | mg/kg-day | -- | -- | -- | 2.62E-05 | mg/kg-day | 1.00E-01 | mg/kg-day | 0.0003 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 1.62E-08 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 6E-10 | 1.14E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 1.13E-09 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 8E-09 | 7.89E-08 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 2.06E-09 | mg/kg-day | -- | -- | -- | 1.44E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00003 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 2.58E-07 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 1E-07 | 1.81E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 5.70E-08 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 1E-07 | 3.99E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 4.71E-08 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 9E-08 | 3.30E-06 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 4.62E-09 | mg/kg-day | -- | -- | -- | 3.24E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | Exp. Route Total | | | | | | | | 4E-07 | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | 5E-07 | | | | | 0.04 |
| | Exp. Medium Total | | | | | | | | | | 5E-07 | | | | | 0.04 |
| | Outdoor Air | Trench (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 2.23E+01 | µg/m³ | 1.82E-02 | µg/m³ | 5.80E-05 | m³/µg | 1E-06 | 1.27E+00 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 1.67E+01 | µg/m³ | 1.36E-02 | µg/m³ | 1.60E-05 | m³/µg | 2E-07 | 9.53E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.5 |
| | | | | 1,1-Dichloroethane | 9.55E+00 | µg/m³ | 7.79E-03 | µg/m³ | 1.60E-06 | m³/µg | 1E-08 | 5.45E-01 | µg/m³ | 5.00E+03 | µg/m³ | 0.0001 |
| | | | | 1,1-Dichloroethene | 1.40E+01 | µg/m³ | 1.14E-02 | µg/m³ | -- | -- | -- | 7.97E-01 | µg/m³ | 4.00E+00 | µg/m³ | 0.2 |
| | | | | 1,2,4-Trichlorobenzene | 1.22E+01 | µg/m³ | 9.99E-03 | µg/m³ | -- | -- | -- | 6.99E-01 | µg/m³ | 2.00E+01 | µg/m³ | 0.03 |
| | | | | 1,2-Dibromo-3-chloropropane | 2.22E+01 | µg/m³ | 1.81E-02 | µg/m³ | 6.00E-03 | m³/µg | 1E-04 | 1.27E+00 | µg/m³ | 2.00E+00 | µg/m³ | 0.6 |
| | | | | 1,2-Dibromoethane | 1.48E+01 | µg/m³ | 1.21E-02 | µg/m³ | 6.00E-04 | m³/µg | 7E-06 | 8.44E-01 | µg/m³ | 2.00E+00 | µg/m³ | 0.4 |
| | | | | 1,2-Dichloropropane | 9.24E+00 | µg/m³ | 7.53E-03 | µg/m³ | 3.70E-06 | m³/µg | 3E-08 | 5.27E-01 | µg/m³ | 9.24E+00 | µg/m³ | 0.06 |
| | | | | 1,2-Dichlorobenzene | 6.69E+00 | µg/m³ | 5.46E-03 | µg/m³ | -- | -- | -- | 3.82E-01 | µg/m³ | 2.00E+03 | µg/m³ | 0.0002 |

Table 7-7.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,3-Dichlorobenzene | 1.07E+01 | µg/m³ | 8.73E-03 | µg/m³ | -- | -- | -- | 6.11E-01 | µg/m³ | 2.00E+03 | µg/m³ | 0.0003 |
| | | | | 1,4-Dichlorobenzene | 8.08E+00 | µg/m³ | 6.59E-03 | µg/m³ | 1.10E-05 | m³/µg | 7E-08 | 4.61E-01 | µg/m³ | 1.20E+03 | µg/m³ | 0.0004 |
| | | | | 2-Hexanone | 3.32E+01 | µg/m³ | 2.71E-02 | µg/m³ | -- | -- | -- | 1.90E+00 | µg/m³ | 3.00E+01 | µg/m³ | 0.06 |
| | | | | Bromodichloromethane | 5.36E+00 | µg/m³ | 4.37E-03 | µg/m³ | 3.70E-05 | m³/µg | 2E-07 | 3.06E-01 | µg/m³ | 2.00E+01 | µg/m³ | 0.02 |
| | | | | Bromoform | 1.30E+01 | µg/m³ | 1.06E-02 | µg/m³ | 1.10E-06 | m³/µg | 1E-08 | 7.40E-01 | µg/m³ | -- | -- | -- |
| | | | | Bromomethane | 1.61E+01 | µg/m³ | 1.32E-02 | µg/m³ | -- | -- | -- | 9.21E-01 | µg/m³ | 1.00E+02 | µg/m³ | 0.009 |
| | | | | Carbon Tetrachloride | 9.75E+00 | µg/m³ | 7.95E-03 | µg/m³ | 6.00E-06 | m³/µg | 5E-08 | 5.56E-01 | µg/m³ | 1.89E+02 | µg/m³ | 0.003 |
| | | | | Chlorobenzene | 8.53E+00 | µg/m³ | 6.95E-03 | µg/m³ | -- | -- | -- | 4.87E-01 | µg/m³ | 5.00E+02 | µg/m³ | 0.001 |
| | | | | Chloromethane | 2.04E+01 | µg/m³ | 1.66E-02 | µg/m³ | 1.80E-06 | m³/µg | 3E-08 | 1.17E+00 | µg/m³ | 3.00E+03 | µg/m³ | 0.0004 |
| | | | | cis-1,3-Dichloropropene | 5.93E+00 | µg/m³ | 4.83E-03 | µg/m³ | 4.00E-06 | m³/µg | 2E-08 | 3.38E-01 | µg/m³ | 3.63E+01 | µg/m³ | 0.009 |
| | | | | Dibromochloromethane | 7.60E+00 | µg/m³ | 6.19E-03 | µg/m³ | -- | -- | -- | 4.34E-01 | µg/m³ | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 3.80E+01 | µg/m³ | 3.10E-02 | µg/m³ | -- | -- | -- | 2.17E+00 | µg/m³ | 1.00E+03 | µg/m³ | 0.002 |
| | | | | Hexachlorobutadiene | 1.13E+00 | µg/m³ | 9.22E-04 | µg/m³ | 2.20E-05 | m³/µg | 2E-08 | 6.45E-02 | µg/m³ | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.25E+01 | µg/m³ | 1.02E-02 | µg/m³ | 2.60E-07 | m³/µg | 3E-09 | 7.14E-01 | µg/m³ | 2.52E+03 | µg/m³ | 0.0003 |
| | | | | Methylene Chloride | 1.19E+01 | µg/m³ | 9.71E-03 | µg/m³ | 1.00E-08 | m³/µg | 1E-10 | 6.80E-01 | µg/m³ | 1.04E+03 | µg/m³ | 0.0007 |
| | | | | trans-1,2-Dichloroethene | 1.77E+01 | µg/m³ | 1.44E-02 | µg/m³ | -- | -- | -- | 1.01E+00 | µg/m³ | 4.00E+02 | µg/m³ | 0.003 |
| | | | | trans-1,3-Dichloropropene | 7.90E+00 | µg/m³ | 6.44E-03 | µg/m³ | 4.00E-06 | m³/µg | 3E-08 | 4.51E-01 | µg/m³ | 3.63E+01 | µg/m³ | 0.01 |
| | | | | Vinyl Chloride | 2.66E-04 | µg/m³ | 2.17E-07 | µg/m³ | 4.40E-06 | m³/µg | 1E-12 | 1.52E-05 | µg/m³ | 8.00E+01 | µg/m³ | 0.0000002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 5.72E-01 | µg/m³ | 4.67E-04 | µg/m³ | 3.30E-04 | m³/µg | 2E-07 | 3.27E-02 | µg/m³ | 1.17E+02 | µg/m³ | 0.0003 |
| | | | | Hexachlorobenzene | 2.10E+00 | µg/m³ | 1.71E-03 | µg/m³ | 4.60E-04 | m³/µg | 8E-07 | 1.20E-01 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 9.09E+00 | µg/m³ | 7.41E-03 | µg/m³ | -- | -- | -- | 5.19E-01 | µg/m³ | 1.12E+02 | µg/m³ | 0.005 |
| | | | | Hexachloroethane | 1.18E+00 | µg/m³ | 9.61E-04 | µg/m³ | 1.10E-05 | m³/µg | 1E-08 | 6.73E-02 | µg/m³ | 5.81E+04 | µg/m³ | 0.000001 |
| | | | | Nitrobenzene | 7.92E-01 | µg/m³ | 6.46E-04 | µg/m³ | 4.00E-05 | m³/µg | 3E-08 | 4.52E-02 | µg/m³ | 2.00E+01 | µg/m³ | 0.002 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 6.32E-03 | µg/m³ | 5.15E-06 | µg/m³ | 4.90E-03 | m³/µg | 3E-08 | 3.61E-04 | µg/m³ | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.30E-06 | µg/m³ | 1.88E-09 | µg/m³ | 5.71E-04 | m³/µg | 1E-12 | 1.31E-07 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1232 | 1.10E+00 | µg/m³ | 8.98E-04 | µg/m³ | 5.71E-04 | m³/µg | 5E-07 | 6.29E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1242 | 4.20E-01 | µg/m³ | 3.42E-04 | µg/m³ | 5.71E-04 | m³/µg | 2E-07 | 2.40E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1248 | 4.03E-01 | µg/m³ | 3.29E-04 | µg/m³ | 5.71E-04 | m³/µg | 2E-07 | 2.30E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1254 | 2.70E-01 | µg/m³ | 2.20E-04 | µg/m³ | 5.71E-04 | m³/µg | 1E-07 | 1.54E-02 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1260 | 2.77E-01 | µg/m³ | 2.26E-04 | µg/m³ | 5.71E-04 | m³/µg | 1E-07 | 1.58E-02 | µg/m³ | -- | -- | -- |
| | | | | Cyanide | 5.27E+01 | µg/m³ | 4.30E-02 | µg/m³ | -- | -- | -- | 3.01E+00 | µg/m³ | 8.00E-01 | µg/m³ | 4 |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | 6 |
| | | Exp. Point Total | | | | | | | | | 1E-04 | | | | | 6 |
| | Exp. Medium Total | | | | | | | | | | 1E-04 | | | | | 6 |
| Medium Total | | | | | | | | | | | 1E-04 | | | | | 6 |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 1E-04 | | | | Total of Receptor Hazards Across All Media | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-8.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.95E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.9 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.9 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.12E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.9 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.9 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.94E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.9 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.99E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.01 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 1.22E-04 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.03 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 5.73E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0003 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 8.23E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.02E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.01 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.74E-04 | mg/kg-day | 2.00E-04 | mg/kg-day | 1 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.30E-04 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.01 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.98E-05 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0006 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.98E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.004 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.98E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0009 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.24E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.06 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 4.24E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 1.35E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.007 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 9.47E-05 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.07 |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.23E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.02 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.48E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 8.73E-05 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 3.74E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.001 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 6.98E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.49E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.001 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 7.73E-05 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 6.73E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.05E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.005 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.23E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.02 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 3.49E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.03 |

Table 7-8.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 8.98E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.04 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.74E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.74E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.09 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.5 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.48E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.12E-04 | mg/kg-day | 8.00E-05 | mg/kg-day | 1 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 4.49E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.01 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.48E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.5 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.0003 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 1.67E-05 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.12E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.006 |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.12E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0006 |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | (2) | -- | -- | -- | -- | 1.47E-05 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 2.19E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.03 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 8.98E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.10E-05 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.02 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | (2) | -- | -- | -- | -- | 1.97E-05 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 2.19E-05 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 1.77E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.009 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 5.24E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.01 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | (2) | -- | -- | -- | -- | 9.22E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.003 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 1.30E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 1.07E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | (2) | -- | -- | -- | -- | 4.49E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | (2) | -- | -- | -- | -- | 4.24E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.99E-06 | mg/kg-day | 2.00E-05 | mg/kg-day | 0.1 |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | (2) | -- | -- | -- | -- | 3.24E-06 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.49E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.4 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.20E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.82E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 3.94E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 9.67E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.25E-04 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.01 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 4.63E-05 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.2 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 6.50E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0007 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.02E-06 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.08E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0003 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.93E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.76E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0005 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.18E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.63E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 8.67E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0004 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 2.67E-06 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.002 |

Table 7-8.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 1.71E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.004 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.72E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0009 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 2.20E-06 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 3.43E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0001 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 4.15E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0002 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.62E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0001 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 2.31E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 1.55E-06 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 2.21E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0004 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.16E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.57E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0002 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 4.87E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.32E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 2.96E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.001 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.47E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0007 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.76E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.006 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.80E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.005 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.93E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.81E-06 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.09 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.66E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.30E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 5.28E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.005 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.24E-06 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.00004 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 4.02E-07 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.57E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0008 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 2.60E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.04 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.13E-05 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.02 |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 6.36E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 1.14E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0006 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.79E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.04 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 3.95E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 3.27E-05 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.70E-06 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.5 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 5 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 5 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 5 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-9.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 8.39E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.08 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.08 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.54E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.09 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.09 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.94E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.09 |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.20E-04 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.006 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 7.34E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.02 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 3.45E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0002 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 4.94E-05 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 6.14E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.006 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.65E-04 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.8 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.79E-05 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.009 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.60E-05 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.0009 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0003 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.79E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.60E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0005 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.95E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.04 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.55E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 8.09E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.004 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 5.69E-05 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.04 |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.01 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 5.24E-05 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.25E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0007 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 4.20E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.50E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0007 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.007 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 4.64E-05 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 4.05E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.007 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 6.29E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.001 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.01 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.10E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |

Table 7-9.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 5.39E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.03 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.65E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.008 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.65E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.05 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.3 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.74E-05 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.8 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.002 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.70E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.007 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.30E-05 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.3 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.0002 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 1.00E-05 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.74E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.003 |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.74E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0003 |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | (2) | -- | -- | -- | -- | 8.84E-06 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 1.32E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.02 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 5.39E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.009 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.59E-06 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.009 |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | (2) | -- | -- | -- | -- | 1.18E-05 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 1.32E-05 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 1.06E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.005 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 3.15E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.006 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | (2) | -- | -- | -- | -- | 5.54E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 7.79E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 6.44E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.70E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | (2) | -- | -- | -- | -- | 2.55E-06 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | (2) | -- | -- | -- | -- | 1.80E-06 | mg/kg-day | 2.00E-05 | mg/kg-day | 0.09 |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | (2) | -- | -- | -- | -- | 1.95E-06 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.50E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.2 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.46E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0007 |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | (2) | -- | -- | -- | -- | 5.19E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.001 |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | (2) | -- | -- | -- | -- | 2.61E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | (2) | -- | -- | -- | -- | 6.42E-06 | mg/kg-day | 5.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | (2) | -- | -- | -- | -- | 8.28E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.008 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.08E-05 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.2 |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.32E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0005 |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.33E-06 | mg/kg-day | 4.00E-02 | mg/kg-day | 0.00008 |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 2.05E-05 | mg/kg-day | 9.00E-02 | mg/kg-day | 0.0002 |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 3.28E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.002 |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.49E-05 | mg/kg-day | 7.00E-02 | mg/kg-day | 0.0004 |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 7.83E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.002 |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.75E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00009 |
| | | | | Bromoform | 2.70E-03 | mg/L | (2) | -- | -- | -- | -- | 5.76E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0003 |
| | | | | Bromomethane | 1.90E-03 | mg/L | (2) | -- | -- | -- | -- | 1.77E-06 | mg/kg-day | 1.40E-03 | mg/kg-day | 0.001 |

Table 7-9.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 1.13E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.14E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | Chloromethane | 1.75E-03 | mg/L | (2) | -- | -- | -- | -- | 1.50E-06 | mg/kg-day | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.28E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.00008 |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | (2) | -- | -- | -- | -- | 2.76E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.74E-05 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00009 |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.53E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | (2) | -- | -- | -- | -- | 1.03E-06 | mg/kg-day | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | (2) | -- | -- | -- | -- | 1.47E-06 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0002 |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | (2) | -- | -- | -- | -- | 7.68E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0004 |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.03E-06 | mg/kg-day | 3.00E-02 | mg/kg-day | 0.0001 |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | (2) | -- | -- | -- | -- | 3.36E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.54E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 1.96E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.001 |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 9.75E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0005 |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.17E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.19E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.003 |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 1.28E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 4.52E-06 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.06 |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 4.42E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0001 |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.62E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.50E-07 | mg/kg-day | 1.00E-04 | mg/kg-day | 0.004 |
| | | | | Atrazine | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 8.24E-07 | mg/kg-day | 3.50E-02 | mg/kg-day | 0.00002 |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | (2) | -- | -- | -- | -- | 2.67E-07 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | (2) | -- | -- | -- | -- | 1.04E-04 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0005 |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | (2) | -- | -- | -- | -- | 1.72E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.03 |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | (2) | -- | -- | -- | -- | 7.47E-06 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.01 |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | (2) | -- | -- | -- | -- | 4.22E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | (2) | -- | -- | -- | -- | 7.56E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0004 |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | (2) | -- | -- | -- | -- | 1.19E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.02 |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 2.62E-05 | mg/kg-day | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | (2) | -- | -- | -- | -- | 2.17E-05 | mg/kg-day | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.18E-06 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.3 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 3 |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.92E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.53E-03 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 1.60E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.11E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.01 |
| | | | | 1,1-Dichloroethane | 1.01E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.32E-03 | µg/m³ | 5.00E+02 | µg/m³ | 0.000003 |
| | | | | 1,1-Dichloroethene | 1.49E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.96E-03 | µg/m³ | 2.00E+02 | µg/m³ | 0.00001 |
| | | | | 1,2,4-Trichlorobenzene | 1.29E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.70E-03 | µg/m³ | 2.00E+00 | µg/m³ | 0.0008 |
| | | | | 1,2-Dibromo-3-chloropropane | 1.47E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.94E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.01 |
| | | | | 1,2-Dibromoethane | 1.40E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.85E-03 | µg/m³ | 9.00E+00 | µg/m³ | 0.0002 |
| | | | | 1,2-Dichloropropane | 9.68E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.27E-03 | µg/m³ | 4.00E+00 | µg/m³ | 0.0003 |
| | | | | 1,2-Dichlorobenzene | 7.07E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.31E-04 | µg/m³ | 2.00E+02 | µg/m³ | 0.000005 |

Table 7-9.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,3-Dichlorobenzene | 1.13E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.49E-03 | µg/m³ | 2.00E+02 | µg/m³ | 0.000007 |
| | | | | 1,4-Dichlorobenzene | 8.64E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.14E-03 | µg/m³ | 8.00E+02 | µg/m³ | 0.000001 |
| | | | | 2-Hexanone | 1.94E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.56E-03 | µg/m³ | 3.00E+01 | µg/m³ | 0.00009 |
| | | | | Bromodichloromethane | 5.80E-02 | µg/m³ | (2) | -- | -- | -- | -- | 7.64E-04 | µg/m³ | -- | -- | -- |
| | | | | Bromoform | 1.22E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.61E-03 | µg/m³ | -- | -- | -- |
| | | | | Bromomethane | 1.70E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.24E-03 | µg/m³ | 5.00E+00 | µg/m³ | 0.0004 |
| | | | | Carbon Tetrachloride | 1.10E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.45E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00001 |
| | | | | Chlorobenzene | 8.93E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.18E-03 | µg/m³ | 5.00E+01 | µg/m³ | 0.00002 |
| | | | | Chloromethane | 1.95E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.57E-03 | µg/m³ | 9.00E+01 | µg/m³ | 0.00003 |
| | | | | cis-1,3-Dichloropropene | 6.17E-02 | µg/m³ | (2) | -- | -- | -- | -- | 8.12E-04 | µg/m³ | 2.00E+01 | µg/m³ | 0.00004 |
| | | | | Dibromochloromethane | 7.54E-02 | µg/m³ | (2) | -- | -- | -- | -- | 9.93E-04 | µg/m³ | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 4.19E-01 | µg/m³ | (2) | -- | -- | -- | -- | 5.52E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00006 |
| | | | | Hexachlorobutadiene | 1.33E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.76E-04 | µg/m³ | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.12E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.47E-03 | µg/m³ | 3.00E+03 | µg/m³ | 0.0000005 |
| | | | | Methylene Chloride | 1.22E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.61E-03 | µg/m³ | 6.00E+02 | µg/m³ | 0.000003 |
| | | | | trans-1,2-Dichloroethene | 1.87E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.47E-03 | µg/m³ | 4.00E+01 | µg/m³ | 0.00006 |
| | | | | trans-1,3-Dichloropropene | 8.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.08E-03 | µg/m³ | 2.00E+01 | µg/m³ | 0.00005 |
| | | | | Vinyl Chloride | 1.53E-01 | µg/m³ | (2) | -- | -- | -- | -- | 2.01E-03 | µg/m³ | 1.00E+02 | µg/m³ | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 2.09E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.76E-05 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorobenzene | 2.34E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.08E-04 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.08E-01 | µg/m³ | (2) | -- | -- | -- | -- | 1.43E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.007 |
| | | | | Hexachloroethane | 1.34E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.77E-04 | µg/m³ | 3.00E+01 | µg/m³ | 0.000006 |
| | | | | Nitrobenzene | 3.27E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.30E-05 | µg/m³ | 9.00E+00 | µg/m³ | 0.000005 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.69E-05 | µg/m³ | (2) | -- | -- | -- | -- | 2.22E-07 | µg/m³ | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 9.73E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.28E-04 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1232 | 1.19E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.57E-04 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1242 | 3.29E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.34E-05 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1248 | 3.40E-03 | µg/m³ | (2) | -- | -- | -- | -- | 4.47E-05 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1254 | 1.93E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.54E-05 | µg/m³ | -- | -- | -- |
| | | | | Aroclor 1260 | 2.06E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.71E-05 | µg/m³ | -- | -- | -- |
| | | | | Cyanide | 2.86E-01 | µg/m³ | (2) | -- | -- | -- | -- | 3.76E-03 | µg/m³ | 8.00E-01 | µg/m³ | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.03 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | | | | | -- | | | | | 3 |
| | | | | | | | | | Total of Receptor Risks Across All Media | | -- | | | Total of Receptor Hazards Across All Media | | 3 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-10.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 1.01E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 2.83E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | 1.83E-07 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | -- |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 5.13E-05 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 3.14E-05 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 1.48E-05 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 2.12E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 2.63E-05 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 8E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 2.20E-04 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 2E-04 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 3.34E-05 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 1.54E-05 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 2.05E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 1.54E-05 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 8.34E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 1.09E-05 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | Bromoform | 2.70E-03 | mg/L | 3.47E-05 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Bromomethane | 1.90E-03 | mg/L | 2.44E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 1.86E-05 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 1.41E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chloromethane | 1.75E-03 | mg/L | 2.25E-05 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 9.63E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 1.80E-05 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 6.42E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 1.99E-05 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 5.39E-05 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 2.70E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 9.40E-05 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 7E-05 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 8.98E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |

Table 7-10.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 2.31E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-06 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 7.06E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 1.41E-05 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 2.89E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 1.16E-05 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 1.41E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Atrazine | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 4.30E-06 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 2.25E-03 | mg/L | 2.89E-05 | mg/kg-day | 1.40E-02 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 2.89E-05 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 2.95E-04 | mg/L | 1.18E-05 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.40E-04 | mg/L | 5.65E-06 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 9E-06 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 2.31E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 2.82E-06 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 3.95E-04 | mg/L | 1.58E-05 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 5.65E-06 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 4E-05 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 4.56E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 1.35E-05 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.85E-06 | mg/L | 2.37E-08 | mg/kg-day | 1.70E+01 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 3.34E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 2.76E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1242 | 9.00E-05 | mg/L | 1.16E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1248 | 8.50E-05 | mg/L | 1.09E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1254 | 6.00E-05 | mg/L | 7.70E-07 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1260 | 6.50E-05 | mg/L | 8.34E-07 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 6.42E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 4E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-03 | mg/L | 6.14E-06 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.45E-03 | mg/L | 2.19E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethane | 1.15E-03 | mg/L | 1.10E-06 | mg/kg-day | 5.70E-03 | 1/(mg/kg-day) | 6E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethene | 1.65E-03 | mg/L | 2.71E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-03 | mg/L | 3.49E-05 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-03 | mg/L | 4.07E-05 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 3E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.60E-03 | mg/L | 1.82E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloropropane | 1.20E-03 | mg/L | 1.40E-06 | mg/kg-day | 3.70E-03 | 1/(mg/kg-day) | 5E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichlorobenzene | 1.00E-03 | mg/L | 8.63E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,3-Dichlorobenzene | 1.60E-03 | mg/L | 1.38E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,4-Dichlorobenzene | 1.20E-03 | mg/L | 1.05E-05 | mg/kg-day | 5.40E-03 | 1/(mg/kg-day) | 6E-08 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 6.50E-03 | mg/L | 3.30E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 8.50E-04 | mg/L | 7.37E-07 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | Bromoform | 2.70E-03 | mg/L | 2.43E-06 | mg/kg-day | 7.90E-03 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Bromomethane | 1.90E-03 | mg/L | 7.46E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-10.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Carbon Tetrachloride | 1.45E-03 | mg/L | 4.78E-06 | mg/kg-day | 7.00E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Chlorobenzene | 1.10E-03 | mg/L | 4.81E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chloromethane | 1.75E-03 | mg/L | 6.29E-07 | mg/kg-day | 1.30E-02 | 1/(mg/kg-day) | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 7.50E-04 | mg/L | 9.59E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Dibromochloromethane | 1.40E-03 | mg/L | 1.16E-06 | mg/kg-day | 8.40E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 5.00E-03 | mg/L | 7.32E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 2.20E-04 | mg/L | 6.46E-06 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.55E-03 | mg/L | 4.33E-07 | mg/kg-day | 1.80E-03 | 1/(mg/kg-day) | 8E-10 | (2) | -- | -- | -- | -- |
| | | | | Methylene Chloride | 1.35E-03 | mg/L | 1.94E-06 | mg/kg-day | 2.00E-03 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | trans-1,2-Dichloroethene | 2.10E-03 | mg/L | 3.24E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | trans-1,3-Dichloropropene | 1.00E-03 | mg/L | 1.28E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.45E-03 | mg/L | 7.27E-06 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 5E-06 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4,6-Trichlorophenol | 7.00E-04 | mg/L | 6.49E-06 | mg/kg-day | 1.10E-02 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrophenol | 1.80E-03 | mg/L | 8.27E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrotoluene | 5.50E-04 | mg/L | 4.11E-07 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 2,6-Dinitrotoluene | 5.50E-04 | mg/L | 4.94E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | 2-Nitrophenol | 1.00E-03 | mg/L | 1.34E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 1.10E-03 | mg/L | 5.40E-06 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.25E-03 | mg/L | 1.91E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 4-Chloroaniline | 2.20E-04 | mg/L | 1.86E-07 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitroaniline | 9.00E-04 | mg/L | 3.63E-07 | mg/kg-day | 2.00E-02 | 1/(mg/kg-day) | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | 4-Nitrophenol | 1.10E-03 | mg/L | 1.48E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Atrazine | 2.20E-04 | mg/L | 3.47E-07 | mg/kg-day | 2.30E-01 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.35E-04 | mg/L | 1.12E-07 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Butylbenzylphthalate | 2.25E-03 | mg/L | 4.38E-05 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 8E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.80E-03 | mg/L | 7.26E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 2.20E-04 | mg/L | 3.15E-06 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.40E-04 | mg/L | 1.78E-07 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 3.55E-04 | mg/L | 3.19E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 1.05E-03 | mg/L | 5.01E-05 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 2.60E-04 | mg/L | 1.11E-05 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1232 | 2.15E-04 | mg/L | 9.14E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 5.00E-03 | mg/L | 4.93E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 1E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 6E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 6E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.92E-01 | µg/m³ | 7.22E-04 | µg/m³ | 5.80E-05 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 1.60E-01 | µg/m³ | 6.04E-04 | µg/m³ | 1.60E-05 | m³/µg | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethane | 1.01E-01 | µg/m³ | 3.78E-04 | µg/m³ | 1.60E-06 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |
| | | | | 1,1-Dichloroethene | 1.49E-01 | µg/m³ | 5.61E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 1.29E-01 | µg/m³ | 4.85E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 1.47E-01 | µg/m³ | 1.45E-01 | µg/m³ | 6.00E-03 | m³/µg | 9E-04 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 1.40E-01 | µg/m³ | 5.28E-04 | µg/m³ | 6.00E-04 | m³/µg | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloropropane | 9.68E-02 | µg/m³ | 3.64E-04 | µg/m³ | 3.70E-06 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichlorobenzene | 7.07E-02 | µg/m³ | 2.66E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |

Table 7-10.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | 1,3-Dichlorobenzene | 1.13E-01 | µg/m³ | 4.25E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | 1,4-Dichlorobenzene | 8.64E-02 | µg/m³ | 3.25E-04 | µg/m³ | 1.10E-05 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | 2-Hexanone | 1.94E-01 | µg/m³ | 7.31E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 5.80E-02 | µg/m³ | 2.18E-04 | µg/m³ | 3.70E-05 | m³/µg | 8E-09 | (2) | -- | -- | -- | -- |
| | | | | Bromoform | 1.22E-01 | µg/m³ | 4.59E-04 | µg/m³ | 1.10E-06 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Bromomethane | 1.70E-01 | µg/m³ | 6.39E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Carbon Tetrachloride | 1.10E-01 | µg/m³ | 4.14E-04 | µg/m³ | 6.00E-06 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Chlorobenzene | 8.93E-02 | µg/m³ | 3.36E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chloromethane | 1.95E-01 | µg/m³ | 7.35E-04 | µg/m³ | 1.80E-06 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | cis-1,3-Dichloropropene | 6.17E-02 | µg/m³ | 2.32E-04 | µg/m³ | 4.00E-06 | m³/µg | 9E-10 | (2) | -- | -- | -- | -- |
| | | | | Dibromochloromethane | 7.54E-02 | µg/m³ | 2.84E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Dichlorodifluoromethane | 4.19E-01 | µg/m³ | 1.58E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 1.33E-02 | µg/m³ | 5.02E-05 | µg/m³ | 2.20E-05 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Methyl Tertiary Butyl Ether | 1.12E-01 | µg/m³ | 4.20E-04 | µg/m³ | 2.60E-07 | m³/µg | 1E-10 | (2) | -- | -- | -- | -- |
| | | | | Methylene Chloride | 1.22E-01 | µg/m³ | 1.20E-01 | µg/m³ | 1.00E-08 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | trans-1,2-Dichloroethene | 1.87E-01 | µg/m³ | 7.05E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | trans-1,3-Dichloropropene | 8.22E-02 | µg/m³ | 3.09E-04 | µg/m³ | 4.00E-06 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.53E-01 | µg/m³ | 2.07E-01 | µg/m³ | 4.40E-06 | m³/µg | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | Bis(2-chloroethyl)ether | 2.09E-03 | µg/m³ | 7.88E-06 | µg/m³ | 3.30E-04 | m³/µg | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 2.34E-02 | µg/m³ | 8.79E-05 | µg/m³ | 4.60E-04 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.08E-01 | µg/m³ | 4.08E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 1.34E-02 | µg/m³ | 5.06E-05 | µg/m³ | 1.10E-05 | m³/µg | 6E-10 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 3.27E-03 | µg/m³ | 1.23E-05 | µg/m³ | 4.00E-05 | m³/µg | 5E-10 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | Aldrin | 1.69E-05 | µg/m³ | 6.36E-08 | µg/m³ | 4.90E-03 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | | | | |
| | | | | Aroclor 1221 | 9.73E-03 | µg/m³ | 3.66E-05 | µg/m³ | 5.71E-04 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1232 | 1.19E-02 | µg/m³ | 4.48E-05 | µg/m³ | 5.71E-04 | m³/µg | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1242 | 3.29E-03 | µg/m³ | 1.24E-05 | µg/m³ | 5.71E-04 | m³/µg | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1248 | 3.40E-03 | µg/m³ | 1.28E-05 | µg/m³ | 5.71E-04 | m³/µg | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1254 | 1.93E-03 | µg/m³ | 7.26E-06 | µg/m³ | 5.71E-04 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Aroclor 1260 | 2.06E-03 | µg/m³ | 7.74E-06 | µg/m³ | 5.71E-04 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 2.86E-01 | µg/m³ | 1.08E-03 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 9E-04 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | | | | | 1E-03 | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | 1E-03 | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-11.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 2.48E-07 | mg/kg-day | -- | -- | -- | 6.93E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.07 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.07 |
| | | | Dermal | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 1.05E-08 | mg/kg-day | -- | -- | -- | 2.94E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.07 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.07 |
| | Outdoor Air | Particulates above Site | Inhalation | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | 4.86E-08 | µg/m³ | -- | -- | -- | 1.36E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.07 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.07 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-12.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 1.92E-08 | mg/kg-day | -- | -- | -- | 1.34E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 7.20E-09 | mg/kg-day | -- | -- | -- | 5.04E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.005 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.005 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | 9.33E-10 | µg/m³ | -- | -- | -- | 6.53E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.02 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.02 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-13.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.41E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.6 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.6 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.52E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.7 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.7 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | (2) | -- | -- | -- | -- | 5.31E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.7 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.7 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-14.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 6.01E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.06 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.06 |
| | | | Dermal | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 3.12E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.06 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.06 |
| | Outdoor Air | Particulates above Site | Inhalation | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | (2) | -- | -- | -- | -- | 5.31E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.06 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 0.06 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-15.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 7.21E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 9.00E-01 | mg/kg | 1.39E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 6.62E-07 | µg/m³ | 5.76E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-16.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 1.93E-07 | mg/kg-day | -- | -- | -- | 5.39E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.05 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | | Dermal | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 8.15E-09 | mg/kg-day | -- | -- | -- | 2.28E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.002 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.06 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.06 |
| | Outdoor Air | Particulates above Site | Inhalation | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | 3.78E-08 | µg/m³ | -- | -- | -- | 1.06E-07 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.06 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.06 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-17.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 1.49E-08 | mg/kg-day | -- | -- | -- | 1.05E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 5.60E-09 | mg/kg-day | -- | -- | -- | 3.92E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.01 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.01 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | 7.26E-10 | µg/m³ | -- | -- | -- | 5.08E-09 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.01 |
| | | | | | | | | | Total of Receptor Risks Across All Media | | -- | | | Total of Receptor Hazards Across All Media | | 0.01 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-18.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.99E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.5 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.5 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 1.18E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.01 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.5 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.13E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.5 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.5 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-19.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk (1) | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient (1) |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 4.67E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.05 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.05 |
| | | | Dermal | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | (2) | -- | -- | -- | -- | 2.43E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0002 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0002 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.05 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Inhalation | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | (2) | -- | -- | -- | -- | 4.13E-08 | µg/m³ | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 0.05 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | 0.05 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-20.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Soil | Total Soil | Total Soil | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 5.61E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 7.00E-01 | mg/kg | 1.08E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Inhalation | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 5.15E-07 | µg/m³ | 4.48E-08 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | -- |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |
| | | | | | | | | | | | -- | | | | | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-21.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | 2.46E-08 | mg/kg-day | -- | -- | -- | 1.72E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | 4.56E-10 | mg/kg-day | -- | -- | -- | 3.19E-09 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.0003 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.0003 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.02 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.02 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | 5.29E-09 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-09 | 3.71E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | 2.71E-09 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 8E-11 | 1.90E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000002 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | 4.37E-08 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 3E-08 | 5.10E-08 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0003 |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | 3.44E-09 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-09 | 2.41E-08 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.000003 |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | 1.39E-09 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 1E-10 | 9.73E-09 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00001 |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | 1.15E-08 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 8E-09 | 1.34E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | 6.62E-09 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-09 | 4.63E-08 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.00002 |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | 9.27E-09 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 4E-09 | 6.49E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)anthracene | 2.10E-04 | mg/L | 1.67E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-09 | 1.95E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 4.25E-04 | mg/L | 3.38E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-08 | 3.94E-08 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0001 |
| | | | | Benzo(b)fluoranthene | 4.10E-04 | mg/L | 3.26E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-09 | 3.80E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(k)fluoranthene | 3.70E-04 | mg/L | 2.94E-08 | mg/kg-day | 1.00E-02 | 1/(mg/kg-day) | 3E-10 | 3.43E-08 | mg/kg-day | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | 4.90E-09 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 5E-09 | 3.43E-08 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 4.80E-04 | mg/L | 6.35E-09 | mg/kg-day | 1.40E-02 | 1/(mg/kg-day) | 9E-11 | 4.45E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000002 |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | 4.63E-09 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 9E-12 | 3.24E-08 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0000002 |
| | | | | Chrysene | 2.45E-04 | mg/L | 1.95E-08 | mg/kg-day | 1.00E-03 | 1/(mg/kg-day) | 2E-11 | 2.27E-08 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.20E-04 | mg/L | 2.54E-08 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-08 | 2.96E-08 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 3.15E-04 | mg/L | 4.17E-09 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 7E-09 | 2.92E-08 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.00004 |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | 2.18E-09 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 9E-11 | 1.53E-08 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.00002 |
| | | | | Indeno(1,2,3-cd)pyrene | 4.35E-04 | mg/L | 3.45E-08 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-09 | 4.03E-08 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | 3.64E-09 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 3E-08 | 2.55E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | 1.46E-08 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 6E-09 | 1.02E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00002 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | 1.85E-11 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 4E-12 | 1.30E-10 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.000004 |
| | | | | 4,4'-DDE | 9.50E-07 | mg/L | 1.26E-11 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 4E-12 | 8.80E-11 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0000003 |
| | | | | 4,4'-DDT | 2.85E-06 | mg/L | 3.77E-11 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 1E-11 | 2.64E-10 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0000005 |
| | | | | Aldrin | 1.95E-06 | mg/L | 2.58E-11 | mg/kg-day | 1.70E+01 | 1/(mg/kg-day) | 4E-10 | 1.81E-10 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.000006 |
| | | | | alpha-BHC | 1.50E-06 | mg/L | 1.99E-11 | mg/kg-day | 6.30E+00 | 1/(mg/kg-day) | 1E-10 | 1.39E-10 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00000002 |
| | | | | Dieldrin | 1.00E-06 | mg/L | 1.32E-11 | mg/kg-day | 1.60E+01 | 1/(mg/kg-day) | 2E-10 | 9.27E-11 | mg/kg-day | 5.00E-05 | mg/kg-day | 0.000002 |
| | | | | Heptachlor | 1.50E-06 | mg/L | 1.99E-11 | mg/kg-day | 4.50E+00 | 1/(mg/kg-day) | 9E-11 | 1.39E-10 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0000003 |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | 1.13E-11 | mg/kg-day | 9.10E+00 | 1/(mg/kg-day) | 1E-10 | 7.88E-11 | mg/kg-day | 1.30E-05 | mg/kg-day | 0.000006 |
| | | | | Toxaphene | 5.50E-05 | mg/L | 7.28E-10 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 8E-10 | 5.10E-09 | mg/kg-day | 9.00E-05 | mg/kg-day | 0.00006 |
| | | | | Cyanide | 5.00E+00 | mg/L | 6.62E-05 | mg/kg-day | -- | -- | -- | 4.63E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.8 |
| | | | | Metals (Total) | | | | | | | | | | | | |

Table 7-21.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Thallium | 1.20E-03 | mg/L | 1.59E-08 | mg/kg-day | -- | -- | -- | 1.11E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | 2E-07 | | | | | 0.8 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | 1.03E-08 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 2E-09 | 7.20E-08 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000004 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | 5.84E-08 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 2E-09 | 4.09E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00004 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | 6.51E-08 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 5E-08 | 1.52E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0008 |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | 3.05E-09 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 6E-09 | 2.13E-08 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.000002 |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | 5.16E-08 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 4E-09 | 3.61E-07 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.0004 |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | 8.78E-09 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 6E-09 | 2.05E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.000007 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | 6.26E-09 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-09 | 4.38E-08 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.00002 |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | 5.75E-08 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 3E-08 | 4.03E-07 | mg/kg-day | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | 2.17E-09 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 2E-09 | 1.52E-08 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | 1.14E-07 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 2E-10 | 7.98E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000004 |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | 3.96E-08 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 2E-09 | 2.77E-07 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.0004 |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | 1.98E-09 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 1E-08 | 1.39E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | 8.79E-07 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 4E-07 | 6.15E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.001 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | 2.78E-09 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 7E-10 | 1.94E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0006 |
| | | | | alpha-BHC | 1.50E-06 | mg/L | 2.28E-10 | mg/kg-day | 6.30E+00 | 1/(mg/kg-day) | 1E-09 | 1.59E-09 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.0000002 |
| | | | | Dieldrin | 1.00E-06 | mg/L | 3.82E-10 | mg/kg-day | 1.60E+01 | 1/(mg/kg-day) | 6E-09 | 2.67E-09 | mg/kg-day | 5.00E-05 | mg/kg-day | 0.00005 |
| | | | | Heptachlor | 1.50E-06 | mg/L | 2.39E-09 | mg/kg-day | 4.50E+00 | 1/(mg/kg-day) | 1E-08 | 1.67E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00003 |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | 2.20E-10 | mg/kg-day | 9.10E+00 | 1/(mg/kg-day) | 2E-09 | 1.54E-09 | mg/kg-day | 1.30E-05 | mg/kg-day | 0.0001 |
| | | | | Cyanide | 5.00E+00 | mg/L | 1.13E-05 | mg/kg-day | -- | -- | -- | 7.94E-05 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.1 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 1.20E-03 | mg/L | 2.38E-09 | mg/kg-day | -- | -- | -- | 1.66E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.002 |
| | | | Exp. Route Total | | | | | | | | 5E-07 | | | | | 0.1 |
| | | Exp. Point Total | | | | | | | | | 2E-07 | | | | | 0.9 |
| | Exp. Medium Total | | | | | | | | | | 2E-07 | | | | | 0.9 |
| Medium Total | | | | | | | | | | | 2E-07 | | | | | 0.9 |
| Notes: | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-22.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 8.23E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.8 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.8 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 1.97E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.02 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.8 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.8 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.8 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.59E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00004 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | (2) | -- | -- | -- | -- | 4.40E-07 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.00004 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.18E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.006 |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 5.58E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00006 |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | (2) | -- | -- | -- | -- | 2.26E-07 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.0002 |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | (2) | -- | -- | -- | -- | 3.11E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0001 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.07E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0005 |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.50E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)anthracene | 2.10E-04 | mg/L | (2) | -- | -- | -- | -- | 4.51E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 4.25E-04 | mg/L | (2) | -- | -- | -- | -- | 9.13E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Benzo(b)fluoranthene | 4.10E-04 | mg/L | (2) | -- | -- | -- | -- | 8.81E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(k)fluoranthene | 3.70E-04 | mg/L | (2) | -- | -- | -- | -- | 7.95E-07 | mg/kg-day | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | (2) | -- | -- | -- | -- | 7.95E-07 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.03E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00005 |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | (2) | -- | -- | -- | -- | 7.52E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.000004 |
| | | | | Chrysene | 2.45E-04 | mg/L | (2) | -- | -- | -- | -- | 5.26E-07 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.20E-04 | mg/L | (2) | -- | -- | -- | -- | 6.87E-07 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 3.15E-04 | mg/L | (2) | -- | -- | -- | -- | 6.77E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0008 |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | (2) | -- | -- | -- | -- | 3.54E-07 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.0005 |
| | | | | Indeno(1,2,3-cd)pyrene | 4.35E-04 | mg/L | (2) | -- | -- | -- | -- | 9.34E-07 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | (2) | -- | -- | -- | -- | 5.91E-07 | mg/kg-day | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 2.36E-06 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.0005 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | (2) | -- | -- | -- | -- | 3.01E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0001 |
| | | | | 4,4'-DDE | 9.50E-07 | mg/L | (2) | -- | -- | -- | -- | 2.04E-09 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.000007 |
| | | | | 4,4'-DDT | 2.85E-06 | mg/L | (2) | -- | -- | -- | -- | 6.12E-09 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.00001 |
| | | | | Aldrin | 1.95E-06 | mg/L | (2) | -- | -- | -- | -- | 4.19E-09 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.0001 |
| | | | | alpha-BHC | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 3.22E-09 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.0000004 |
| | | | | Dieldrin | 1.00E-06 | mg/L | (2) | -- | -- | -- | -- | 2.15E-09 | mg/kg-day | 5.00E-05 | mg/kg-day | 0.00004 |
| | | | | Heptachlor | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 3.22E-09 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.000006 |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | (2) | -- | -- | -- | -- | 1.83E-09 | mg/kg-day | 1.30E-05 | mg/kg-day | 0.0001 |
| | | | | Toxaphene | 5.50E-05 | mg/L | (2) | -- | -- | -- | -- | 1.18E-07 | mg/kg-day | 9.00E-05 | mg/kg-day | 0.001 |
| | | | | Cyanide | 5.00E+00 | mg/L | (2) | -- | -- | -- | -- | 1.07E-02 | mg/kg-day | 6.00E-04 | mg/kg-day | 18 |
| | | | | Metals (Total) | | | | | | | | | | | | |

Table 7-22.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Thallium | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 2.58E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.3 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 18 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 4.46E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00002 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | (2) | -- | -- | -- | -- | 2.53E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0003 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 9.41E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.005 |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 1.32E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00001 |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | (2) | -- | -- | -- | -- | 2.24E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.002 |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | (2) | -- | -- | -- | -- | 1.27E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.71E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0001 |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.49E-06 | mg/kg-day | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | (2) | -- | -- | -- | -- | 9.40E-08 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | (2) | -- | -- | -- | -- | 4.94E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00002 |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | (2) | -- | -- | -- | -- | 1.71E-06 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.002 |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | (2) | -- | -- | -- | -- | 8.58E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.81E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.008 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | (2) | -- | -- | -- | -- | 1.20E-07 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.004 |
| | | | | alpha-BHC | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 9.87E-09 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.000001 |
| | | | | Dieldrin | 1.00E-06 | mg/L | (2) | -- | -- | -- | -- | 1.65E-08 | mg/kg-day | 5.00E-05 | mg/kg-day | 0.0003 |
| | | | | Heptachlor | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 1.04E-07 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0002 |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | (2) | -- | -- | -- | -- | 9.52E-09 | mg/kg-day | 1.30E-05 | mg/kg-day | 0.0007 |
| | | | | Cyanide | 5.00E+00 | mg/L | (2) | -- | -- | -- | -- | 4.92E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.8 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 1.03E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.01 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.9 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 19 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 19 |
| Medium Total | | | | | | | | | | | -- | | | | | 19 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 20 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-23.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 7.72E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.08 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.08 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | (2) | -- | -- | -- | -- | 3.96E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.004 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.08 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 0.08 |
| Medium Total | | | | | | | | | | | -- | | | | | 0.08 |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.32E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000007 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | (2) | -- | -- | -- | -- | 6.78E-08 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.000007 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.82E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.0009 |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 8.60E-08 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00001 |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | (2) | -- | -- | -- | -- | 3.47E-08 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.00003 |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | (2) | -- | -- | -- | -- | 4.79E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.65E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.00008 |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.31E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)anthracene | 2.10E-04 | mg/L | (2) | -- | -- | -- | -- | 6.94E-08 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 4.25E-04 | mg/L | (2) | -- | -- | -- | -- | 1.40E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.0005 |
| | | | | Benzo(b)fluoranthene | 4.10E-04 | mg/L | (2) | -- | -- | -- | -- | 1.36E-07 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(k)fluoranthene | 3.70E-04 | mg/L | (2) | -- | -- | -- | -- | 1.22E-07 | mg/kg-day | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | (2) | -- | -- | -- | -- | 1.22E-07 | mg/kg-day | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 4.80E-04 | mg/L | (2) | -- | -- | -- | -- | 1.59E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.000008 |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.16E-07 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.0000006 |
| | | | | Chrysene | 2.45E-04 | mg/L | (2) | -- | -- | -- | -- | 8.10E-08 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.20E-04 | mg/L | (2) | -- | -- | -- | -- | 1.06E-07 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 3.15E-04 | mg/L | (2) | -- | -- | -- | -- | 1.04E-07 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.0001 |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | (2) | -- | -- | -- | -- | 5.45E-08 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.00008 |
| | | | | Indeno(1,2,3-cd)pyrene | 4.35E-04 | mg/L | (2) | -- | -- | -- | -- | 1.44E-07 | mg/kg-day | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | (2) | -- | -- | -- | -- | 9.09E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 3.64E-07 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.00007 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | (2) | -- | -- | -- | -- | 4.63E-10 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.00002 |
| | | | | 4,4'-DDE | 9.50E-07 | mg/L | (2) | -- | -- | -- | -- | 3.14E-10 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.000001 |
| | | | | 4,4'-DDT | 2.85E-06 | mg/L | (2) | -- | -- | -- | -- | 9.42E-10 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.000002 |
| | | | | Aldrin | 1.95E-06 | mg/L | (2) | -- | -- | -- | -- | 6.45E-10 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.00002 |
| | | | | alpha-BHC | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 4.96E-10 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.00000006 |
| | | | | Dieldrin | 1.00E-06 | mg/L | (2) | -- | -- | -- | -- | 3.31E-10 | mg/kg-day | 5.00E-05 | mg/kg-day | 0.000007 |
| | | | | Heptachlor | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 4.96E-10 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.000001 |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | (2) | -- | -- | -- | -- | 2.81E-10 | mg/kg-day | 1.30E-05 | mg/kg-day | 0.00002 |
| | | | | Toxaphene | 5.50E-05 | mg/L | (2) | -- | -- | -- | -- | 1.82E-08 | mg/kg-day | 9.00E-05 | mg/kg-day | 0.0002 |
| | | | | Cyanide | 5.00E+00 | mg/L | (2) | -- | -- | -- | -- | 1.65E-03 | mg/kg-day | 6.00E-04 | mg/kg-day | 3 |
| | | | | Metals (Total) | | | | | | | | | | | | |

Table 7-23.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Thallium | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 3.97E-07 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.04 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 3 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.55E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00001 |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | (2) | -- | -- | -- | -- | 1.45E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | (2) | -- | -- | -- | -- | 5.39E-07 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.003 |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | (2) | -- | -- | -- | -- | 7.56E-08 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.000008 |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | (2) | -- | -- | -- | -- | 1.28E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.001 |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | (2) | -- | -- | -- | -- | 7.27E-08 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.00002 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.55E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.00008 |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.43E-06 | mg/kg-day | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | (2) | -- | -- | -- | -- | 5.38E-08 | mg/kg-day | -- | -- | -- |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.83E-06 | mg/kg-day | 2.00E-01 | mg/kg-day | 0.00001 |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | (2) | -- | -- | -- | -- | 9.82E-07 | mg/kg-day | 7.00E-04 | mg/kg-day | 0.001 |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | (2) | -- | -- | -- | -- | 4.91E-08 | mg/kg-day | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | (2) | -- | -- | -- | -- | 2.18E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.004 |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | (2) | -- | -- | -- | -- | 6.90E-08 | mg/kg-day | 3.00E-05 | mg/kg-day | 0.002 |
| | | | | alpha-BHC | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 5.65E-09 | mg/kg-day | 8.00E-03 | mg/kg-day | 0.0000007 |
| | | | | Dieldrin | 1.00E-06 | mg/L | (2) | -- | -- | -- | -- | 9.47E-09 | mg/kg-day | 5.00E-05 | mg/kg-day | 0.0002 |
| | | | | Heptachlor | 1.50E-06 | mg/L | (2) | -- | -- | -- | -- | 5.94E-08 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.0001 |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | (2) | -- | -- | -- | -- | 5.45E-09 | mg/kg-day | 1.30E-05 | mg/kg-day | 0.0004 |
| | | | | Cyanide | 5.00E+00 | mg/L | (2) | -- | -- | -- | -- | 2.82E-04 | mg/kg-day | 6.00E-04 | mg/kg-day | 0.5 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 1.20E-03 | mg/L | (2) | -- | -- | -- | -- | 5.90E-08 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.006 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.5 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 3 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 3 |
| Medium Total | | | | | | | | | | | -- | | | | | 3 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | Total of Receptor Hazards Across All Media 3 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-24.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Sediment | Sediment | Sediment | Ingestion | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | 9.26E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 2.30E+00 | mg/kg | 2.82E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | -- | | | | | -- |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | -- |
| Surface Water | Surface Water | Surface Water | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | 1.11E-07 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | 5.71E-08 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | 4.93E-07 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | 7.24E-08 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | 2.92E-08 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | 1.19E-06 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 9E-07 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | 1.39E-07 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | 1.95E-07 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 9E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 2.10E-04 | mg/L | 1.88E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 4.25E-04 | mg/L | 3.81E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(b)fluoranthene | 4.10E-04 | mg/L | 3.67E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Benzo(k)fluoranthene | 3.70E-04 | mg/L | 3.32E-07 | mg/kg-day | 1.00E-02 | 1/(mg/kg-day) | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | 1.03E-07 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | bis(2-Ethylhexyl)phthalate | 4.80E-04 | mg/L | 1.34E-07 | mg/kg-day | 1.40E-02 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | 9.75E-08 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Chrysene | 2.45E-04 | mg/L | 2.20E-07 | mg/kg-day | 1.00E-03 | 1/(mg/kg-day) | 2E-10 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 3.20E-04 | mg/L | 2.87E-07 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 3.15E-04 | mg/L | 8.77E-08 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | 4.60E-08 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Indeno(1,2,3-cd)pyrene | 4.35E-04 | mg/L | 3.90E-07 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | 7.66E-08 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | 3.06E-07 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | 3.90E-10 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 9E-11 | (2) | -- | -- | -- | -- |
| | | | | 4,4'-DDE | 9.50E-07 | mg/L | 2.65E-10 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 9E-11 | (2) | -- | -- | -- | -- |
| | | | | 4,4'-DDT | 2.85E-06 | mg/L | 7.94E-10 | mg/kg-day | 3.40E-01 | 1/(mg/kg-day) | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Aldrin | 1.95E-06 | mg/L | 5.43E-10 | mg/kg-day | 1.70E+01 | 1/(mg/kg-day) | 9E-09 | (2) | -- | -- | -- | -- |
| | | | | alpha-BHC | 1.50E-06 | mg/L | 4.18E-10 | mg/kg-day | 6.30E+00 | 1/(mg/kg-day) | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Dieldrin | 1.00E-06 | mg/L | 2.79E-10 | mg/kg-day | 1.60E+01 | 1/(mg/kg-day) | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Heptachlor | 1.50E-06 | mg/L | 4.18E-10 | mg/kg-day | 4.50E+00 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | 2.37E-10 | mg/kg-day | 9.10E+00 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Toxaphene | 5.50E-05 | mg/L | 1.53E-08 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 5.00E+00 | mg/L | 1.39E-03 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |

Table 7-24.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Thallium | 1.20E-03 | mg/L | 3.34E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-06 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | 1.11E-07 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2,4-Trichlorobenzene | 2.05E-04 | mg/L | 6.32E-07 | mg/kg-day | 2.90E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 5.50E-04 | mg/L | 5.65E-07 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.60E-04 | mg/L | 3.29E-08 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 1.05E-04 | mg/L | 5.58E-07 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 1.45E-04 | mg/L | 4.97E-07 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | 6.76E-08 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 7.00E-04 | mg/L | 6.22E-07 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 3.70E-04 | mg/L | 2.34E-08 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | Butylbenzylphthalate | 3.50E-04 | mg/L | 1.23E-06 | mg/kg-day | 1.90E-03 | 1/(mg/kg-day) | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Hexachloroethane | 1.65E-04 | mg/L | 4.27E-07 | mg/kg-day | 4.00E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 2.75E-04 | mg/L | 2.14E-08 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 1.10E-03 | mg/L | 9.50E-06 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Pesticides | | | | | | | | | | | | |
| | | | | 4,4'-DDD | 1.40E-06 | mg/L | 3.00E-08 | mg/kg-day | 2.40E-01 | 1/(mg/kg-day) | 7E-09 | (2) | -- | -- | -- | -- |
| | | | | alpha-BHC | 1.50E-06 | mg/L | 2.46E-09 | mg/kg-day | 6.30E+00 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Dieldrin | 1.00E-06 | mg/L | 4.12E-09 | mg/kg-day | 1.60E+01 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Heptachlor | 1.50E-06 | mg/L | 2.58E-08 | mg/kg-day | 4.50E+00 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | Heptachlor epoxide | 8.50E-07 | mg/L | 2.37E-09 | mg/kg-day | 9.10E+00 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Cyanide | 5.00E+00 | mg/L | 1.23E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Thallium | 1.20E-03 | mg/L | 2.57E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-06 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 3E-06 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 3E-06 | | | | | -- |
| Medium Total | | | | | | | | | | | 3E-06 | | | | | -- |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 3E-06 | | | | Total of Receptor Hazards Across All Media | -- |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-25.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Child) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | 1,1,2-Trichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.005 |
| | | | | 1,2-Dibromo-3-chloropropane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.1 |
| | | | | 1,2-Dibromoethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.002 |
| | | | | 1,2-Dichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.003 |
| | | | | Bromodichloromethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.001 |
| | | | | Chloroform | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.002 |
| | | | | Hexachlorobutadiene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 9.97E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Trichloroethene | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.04 |
| | | | | Vinyl Chloride | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.007 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 9.97E-06 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00002 |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.49E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.01 |
| | | | | 2,6-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.49E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.08 |
| | | | | 3,3-Dichlorobenzidine | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.99E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.00E-03 | mg/L | (2) | -- | -- | -- | -- | 9.97E-05 | mg/kg-day | 8.00E-05 | mg/kg-day | 1 |
| | | | | Benzo(a)anthracene | 8.00E-05 | mg/L | (2) | -- | -- | -- | -- | 3.99E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 8.00E-05 | mg/L | (2) | -- | -- | -- | -- | 3.99E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.01 |
| | | | | Bis(2-chloroethyl)ether | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 9.97E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 8.00E-05 | mg/L | (2) | -- | -- | -- | -- | 3.99E-06 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.02 |
| | | | | Hexachlorocyclopentadiene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 7.98E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.01 |
| | | | | n-Nitrosodi-n-propylamine | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.99E-05 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 9.97E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.005 |
| | | | | Pentachlorophenol | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 3.74E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.007 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.00E-08 | mg/L | (2) | -- | -- | -- | -- | 4.99E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.7 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 7.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.74E-04 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.9 |
| | | | | Arsenic | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.99E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.7 |
| | | | | Cadmium (Water) | 1.25E-03 | mg/L | (2) | -- | -- | -- | -- | 6.23E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.1 |
| | | | | Chromium, Total | 2.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.25E-04 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.04 |
| | | | | Cobalt | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 3.24E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 1 |
| | | | | Thallium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 6.23E-04 | mg/kg-day | 1.00E-05 | mg/kg-day | 62 |
| | | | | Vanadium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 6.23E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.1 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 68 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.20E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0001 |
| | | | | 1,1,2-Trichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.28E-06 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0003 |
| | | | | 1,2-Dibromo-3-chloropropane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 3.37E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.02 |
| | | | | 1,2-Dibromoethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.00E-06 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.0001 |
| | | | | 1,2-Dichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.52E-07 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.0001 |
| | | | | Bromodichloromethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.24E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00006 |
| | | | | Chloroform | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.58E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0002 |
| | | | | Hexachlorobutadiene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.10E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.02 |
| | | | | Trichloroethene | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.90E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.006 |

Table 7-25.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Child) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Vinyl Chloride | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.34E-06 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.37E-05 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00003 |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.34E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0007 |
| | | | | 2,6-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.60E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.005 |
| | | | | 3,3-Dichlorobenzidine | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.75E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.00E-03 | mg/L | (2) | -- | -- | -- | -- | 6.06E-06 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.08 |
| | | | | Bis(2-chloroethyl)ether | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.40E-07 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 2.31E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.04 |
| | | | | n-Nitrosodi-n-propylamine | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 5.78E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 6.41E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0003 |
| | | | | Pentachlorophenol | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 1.28E-04 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.03 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 7.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.65E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.03 |
| | | | | Arsenic | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 8.79E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.003 |
| | | | | Cadmium (Water) | 1.25E-03 | mg/L | (2) | -- | -- | -- | -- | 2.75E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.01 |
| | | | | Chromium, Total | 2.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.10E-06 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.01 |
| | | | | Cobalt | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 5.71E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Thallium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 2.75E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.3 |
| | | | | Vanadium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 2.75E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.5 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 68 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 68 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | | | | | -- | | | | | 68 |
| | | | | | | | | | | Total of Receptor Risks Across All Media | -- | | | | Total of Receptor Hazards Across All Media | 68 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.
(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-26.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | 1,1,2-Trichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.003 |
| | | | | 1,2-Dibromo-3-chloropropane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.06 |
| | | | | 1,2-Dibromoethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.001 |
| | | | | 1,2-Dichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.002 |
| | | | | Bromodichloromethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.0006 |
| | | | | Chloroform | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.001 |
| | | | | Hexachlorobutadiene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 5.99E-06 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.006 |
| | | | | Trichloroethene | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.02 |
| | | | | Vinyl Chloride | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.004 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 5.99E-06 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00001 |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.50E-05 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.007 |
| | | | | 2,6-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.50E-05 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.05 |
| | | | | 3,3-Dichlorobenzidine | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 3.00E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.00E-03 | mg/L | (2) | -- | -- | -- | -- | 5.99E-05 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.7 |
| | | | | Benzo(a)anthracene | 8.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.40E-06 | mg/kg-day | -- | -- | -- |
| | | | | Benzo(a)pyrene | 8.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.40E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.008 |
| | | | | Bis(2-chloroethyl)ether | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 5.99E-06 | mg/kg-day | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 8.00E-05 | mg/L | (2) | -- | -- | -- | -- | 2.40E-06 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | 8.00E-04 | mg/kg-day | 0.01 |
| | | | | Hexachlorocyclopentadiene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 4.79E-05 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.008 |
| | | | | n-Nitrosodi-n-propylamine | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.20E-05 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 5.99E-06 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.003 |
| | | | | Pentachlorophenol | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 2.25E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.004 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.00E-08 | mg/L | (2) | -- | -- | -- | -- | 3.00E-10 | mg/kg-day | 7.00E-10 | mg/kg-day | 0.4 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 7.50E-03 | mg/L | (2) | -- | -- | -- | -- | 2.25E-04 | mg/kg-day | 4.00E-04 | mg/kg-day | 0.6 |
| | | | | Arsenic | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.20E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.4 |
| | | | | Cadmium (Water) | 1.25E-03 | mg/L | (2) | -- | -- | -- | -- | 3.75E-05 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.07 |
| | | | | Chromium, Total | 2.50E-03 | mg/L | (2) | -- | -- | -- | -- | 7.49E-05 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.02 |
| | | | | Cobalt | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.95E-04 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.6 |
| | | | | Thallium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 3.75E-04 | mg/kg-day | 1.00E-05 | mg/kg-day | 37 |
| | | | | Vanadium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 3.75E-04 | mg/kg-day | 5.04E-03 | mg/kg-day | 0.07 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 41 |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.46E-06 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00007 |
| | | | | 1,1,2-Trichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.48E-07 | mg/kg-day | 4.00E-03 | mg/kg-day | 0.0002 |
| | | | | 1,2-Dibromo-3-chloropropane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 2.24E-06 | mg/kg-day | 2.00E-04 | mg/kg-day | 0.01 |
| | | | | 1,2-Dibromoethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 6.64E-07 | mg/kg-day | 9.00E-03 | mg/kg-day | 0.00007 |
| | | | | 1,2-Dichloroethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 5.66E-07 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.00009 |
| | | | | Bromodichloromethane | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.23E-07 | mg/kg-day | 2.00E-02 | mg/kg-day | 0.00004 |
| | | | | Chloroform | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.05E-06 | mg/kg-day | 1.00E-02 | mg/kg-day | 0.0001 |
| | | | | Hexachlorobutadiene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.39E-05 | mg/kg-day | 1.00E-03 | mg/kg-day | 0.01 |
| | | | | Trichloroethene | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.93E-06 | mg/kg-day | 5.00E-04 | mg/kg-day | 0.004 |

Table 7-26.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Vinyl Chloride | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 9.28E-07 | mg/kg-day | 3.00E-03 | mg/kg-day | 0.0003 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 9.07E-06 | mg/kg-day | 5.00E-01 | mg/kg-day | 0.00002 |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 8.87E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0004 |
| | | | | 2,6-Dinitrotoluene | 5.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.06E-06 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.004 |
| | | | | 3,3-Dichlorobenzidine | 1.00E-03 | mg/L | (2) | -- | -- | -- | -- | 1.16E-05 | mg/kg-day | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.00E-03 | mg/L | (2) | -- | -- | -- | -- | 4.02E-06 | mg/kg-day | 8.00E-05 | mg/kg-day | 0.05 |
| | | | | Bis(2-chloroethyl)ether | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 1.59E-07 | mg/kg-day | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.60E-03 | mg/L | (2) | -- | -- | -- | -- | 1.53E-04 | mg/kg-day | 6.00E-03 | mg/kg-day | 0.03 |
| | | | | n-Nitrosodi-n-propylamine | 4.00E-04 | mg/L | (2) | -- | -- | -- | -- | 3.84E-07 | mg/kg-day | -- | -- | -- |
| | | | | Nitrobenzene | 2.00E-04 | mg/L | (2) | -- | -- | -- | -- | 4.26E-07 | mg/kg-day | 2.00E-03 | mg/kg-day | 0.0002 |
| | | | | Pentachlorophenol | 7.50E-04 | mg/L | (2) | -- | -- | -- | -- | 8.49E-05 | mg/kg-day | 5.00E-03 | mg/kg-day | 0.02 |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 7.50E-03 | mg/L | (2) | -- | -- | -- | -- | 1.25E-06 | mg/kg-day | 6.00E-05 | mg/kg-day | 0.02 |
| | | | | Arsenic | 4.00E-03 | mg/L | (2) | -- | -- | -- | -- | 6.69E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.002 |
| | | | | Cadmium (Water) | 1.25E-03 | mg/L | (2) | -- | -- | -- | -- | 2.09E-07 | mg/kg-day | 2.50E-05 | mg/kg-day | 0.008 |
| | | | | Chromium, Total | 2.50E-03 | mg/L | (2) | -- | -- | -- | -- | 8.36E-07 | mg/kg-day | 7.50E-05 | mg/kg-day | 0.01 |
| | | | | Cobalt | 6.50E-03 | mg/L | (2) | -- | -- | -- | -- | 4.35E-07 | mg/kg-day | 3.00E-04 | mg/kg-day | 0.001 |
| | | | | Thallium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 2.09E-06 | mg/kg-day | 1.00E-05 | mg/kg-day | 0.2 |
| | | | | Vanadium | 1.25E-02 | mg/L | (2) | -- | -- | -- | -- | 2.09E-06 | mg/kg-day | 1.31E-04 | mg/kg-day | 0.02 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.4 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 41 |
| | Exp. Medium Total | | | | | | | | | | -- | | | | | 41 |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.92E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.53E-04 | µg/m³ | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.62E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.45E-04 | µg/m³ | 2.00E-01 | µg/m³ | 0.002 |
| | | | | 1,2-Dibromo-3-chloropropane | 1.07E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.41E-04 | µg/m³ | 2.00E-01 | µg/m³ | 0.0007 |
| | | | | 1,2-Dibromoethane | 2.16E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.84E-04 | µg/m³ | 9.00E+00 | µg/m³ | 0.00003 |
| | | | | 1,2-Dichloroethane | 3.13E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.12E-04 | µg/m³ | 7.00E+00 | µg/m³ | 0.00006 |
| | | | | Bromodichloromethane | 2.73E-02 | µg/m³ | (2) | -- | -- | -- | -- | 3.60E-04 | µg/m³ | -- | -- | -- |
| | | | | Chloroform | 3.20E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.22E-04 | µg/m³ | 9.77E+01 | µg/m³ | 0.000004 |
| | | | | Hexachlorobutadiene | 1.21E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.60E-04 | µg/m³ | -- | -- | -- |
| | | | | Trichloroethene | 3.19E-02 | µg/m³ | (2) | -- | -- | -- | -- | 4.20E-04 | µg/m³ | 2.00E+00 | µg/m³ | 0.0002 |
| | | | | Vinyl Chloride | 4.22E-02 | µg/m³ | (2) | -- | -- | -- | -- | 5.55E-04 | µg/m³ | 1.00E+02 | µg/m³ | 0.000006 |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 9.32E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.23E-04 | µg/m³ | 4.00E-01 | µg/m³ | 0.0003 |
| | | | | Benzo(a)anthracene | 2.87E-04 | µg/m³ | (2) | -- | -- | -- | -- | 3.78E-06 | µg/m³ | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 1.25E-03 | µg/m³ | (2) | -- | -- | -- | -- | 1.65E-05 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorobenzene | 2.12E-02 | µg/m³ | (2) | -- | -- | -- | -- | 2.80E-04 | µg/m³ | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 9.64E-02 | µg/m³ | (2) | -- | -- | -- | -- | 1.27E-03 | µg/m³ | 2.00E-01 | µg/m³ | 0.006 |
| | | | | Nitrobenzene | 1.84E-03 | µg/m³ | (2) | -- | -- | -- | -- | 2.42E-05 | µg/m³ | 9.00E+00 | µg/m³ | 0.000003 |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.08E-07 | µg/m³ | (2) | -- | -- | -- | -- | 1.42E-09 | µg/m³ | 4.00E-05 | µg/m³ | 0.00004 |
| | | | Exp. Route Total | | | | | | | | -- | | | | | 0.009 |
| | | Exp. Point Total | | | | | | | | | -- | | | | | 0.009 |
| Medium Total | | | | | | | | | | | -- | | | | | 41 |
| | | | | | | | | | | | Total of Receptor Risks Across All Media | | | | | 41 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-26.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

Table 7-27.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Groundwater | Groundwater | Groundwater | Ingestion | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 4.00E-04 | mg/L | 1.60E-05 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloroethane | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 2.00E-04 | mg/L | 2.57E-06 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 2E-07 | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 4.00E-04 | mg/L | 7.35E-06 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 4.00E-04 | mg/L | 2.59E-05 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 2.00E-04 | mg/L | 2.57E-06 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | 6.42E-06 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 2,6-Dinitrotoluene | 5.00E-04 | mg/L | 6.42E-06 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 1.00E-03 | mg/L | 1.28E-05 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 6E-06 | (2) | -- | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.00E-03 | mg/L | 2.57E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 8.00E-05 | mg/L | 3.19E-06 | mg/kg-day | 1.00E-01 | 1/(mg/kg-day) | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)pyrene | 8.00E-05 | mg/L | 3.19E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 2.00E-04 | mg/L | 2.57E-06 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Dibenz(a,h)anthracene | 8.00E-05 | mg/L | 3.19E-06 | mg/kg-day | 1.00E+00 | 1/(mg/kg-day) | 3E-06 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 1.60E+00 | 1/(mg/kg-day) | 8E-06 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.60E-03 | mg/L | 2.05E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.00E-04 | mg/L | 5.13E-06 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 4E-05 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 2.00E-04 | mg/L | 2.57E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 7.50E-04 | mg/L | 9.63E-06 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 4E-06 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.00E-08 | mg/L | 1.28E-10 | mg/kg-day | 1.30E+05 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 7.50E-03 | mg/L | 9.63E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 4.00E-03 | mg/L | 5.13E-05 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 8E-05 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 1.25E-03 | mg/L | 1.60E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 2.50E-03 | mg/L | 9.98E-05 | mg/kg-day | 5.00E-01 | 1/(mg/kg-day) | 5E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.50E-03 | mg/L | 8.34E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.25E-02 | mg/L | 1.60E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.25E-02 | mg/L | 1.60E-04 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 3E-04 | | | | | -- |
| | | | Dermal | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 4.00E-04 | mg/L | 6.14E-07 | mg/kg-day | 2.00E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 4.00E-04 | mg/L | 3.57E-07 | mg/kg-day | 5.70E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 4.00E-04 | mg/L | 2.96E-06 | mg/kg-day | 8.00E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 4.00E-04 | mg/L | 2.80E-07 | mg/kg-day | 2.00E+00 | 1/(mg/kg-day) | 6E-07 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloroethane | 4.00E-04 | mg/L | 2.39E-07 | mg/kg-day | 9.10E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 4.00E-04 | mg/L | 3.47E-07 | mg/kg-day | 6.20E-02 | 1/(mg/kg-day) | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 4.00E-04 | mg/L | 4.42E-07 | mg/kg-day | 3.10E-02 | 1/(mg/kg-day) | 1E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 2.00E-04 | mg/L | 5.87E-06 | mg/kg-day | 7.80E-02 | 1/(mg/kg-day) | 5E-07 | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 4.00E-04 | mg/L | 1.17E-06 | mg/kg-day | 4.60E-02 | 1/(mg/kg-day) | 5E-08 | (2) | -- | -- | -- | -- |

Table 7-27.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Vinyl Chloride | 4.00E-04 | mg/L | 2.01E-06 | mg/kg-day | 7.20E-01 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 2.00E-04 | mg/L | 3.82E-06 | mg/kg-day | 8.00E-03 | 1/(mg/kg-day) | 3E-08 | (2) | -- | -- | -- | -- |
| | | | | 2,4-Dinitrotoluene | 5.00E-04 | mg/L | 3.74E-07 | mg/kg-day | 3.10E-01 | 1/(mg/kg-day) | 1E-07 | (2) | -- | -- | -- | -- |
| | | | | 2,6-Dinitrotoluene | 5.00E-04 | mg/L | 4.49E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 7E-07 | (2) | -- | -- | -- | -- |
| | | | | 3,3-Dichlorobenzidine | 1.00E-03 | mg/L | 4.91E-06 | mg/kg-day | 4.50E-01 | 1/(mg/kg-day) | 2E-06 | (2) | -- | -- | -- | -- |
| | | | | 4,6-Dinitro-2-methylphenol | 2.00E-03 | mg/L | 1.70E-06 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 2.00E-04 | mg/L | 6.71E-08 | mg/kg-day | 1.10E+00 | 1/(mg/kg-day) | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 1.60E-03 | mg/L | 6.46E-05 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | n-Nitrosodi-n-propylamine | 4.00E-04 | mg/L | 1.62E-07 | mg/kg-day | 7.00E+00 | 1/(mg/kg-day) | 1E-06 | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 2.00E-04 | mg/L | 1.79E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Pentachlorophenol | 7.50E-04 | mg/L | 3.58E-05 | mg/kg-day | 4.00E-01 | 1/(mg/kg-day) | 1E-05 | (2) | -- | -- | -- | -- |
| | | | | Metals (Total) | | | | | | | | | | | | |
| | | | | Antimony | 7.50E-03 | mg/L | 5.14E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Arsenic | 4.00E-03 | mg/L | 2.74E-07 | mg/kg-day | 1.50E+00 | 1/(mg/kg-day) | 4E-07 | (2) | -- | -- | -- | -- |
| | | | | Cadmium (Water) | 1.25E-03 | mg/L | 8.57E-08 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Chromium, Total | 2.50E-03 | mg/L | 1.08E-06 | mg/kg-day | 2.00E+01 | 1/(mg/kg-day) | 2E-05 | (2) | -- | -- | -- | -- |
| | | | | Cobalt | 6.50E-03 | mg/L | 1.78E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Thallium | 1.25E-02 | mg/L | 8.57E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Vanadium | 1.25E-02 | mg/L | 8.57E-07 | mg/kg-day | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 5E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 3E-04 | | | | | -- |
| | Exp. Medium Total | | | | | | | | | | 3E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | Inhalation | | | | | | | | | | | | | |
| | | | | Volatile Organic Compounds (VOCs) | | | | | | | | | | | | |
| | | | | 1,1,2,2-Tetrachloroethane | 1.92E-02 | µg/m³ | 7.22E-05 | µg/m³ | 5.80E-05 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,1,2-Trichloroethane | 2.62E-02 | µg/m³ | 9.86E-05 | µg/m³ | 1.60E-05 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromo-3-chloropropane | 1.07E-02 | µg/m³ | 1.06E-02 | µg/m³ | 6.00E-03 | m³/µg | 6E-05 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dibromoethane | 2.16E-02 | µg/m³ | 8.13E-05 | µg/m³ | 6.00E-04 | m³/µg | 5E-08 | (2) | -- | -- | -- | -- |
| | | | | 1,2-Dichloroethane | 3.13E-02 | µg/m³ | 1.18E-04 | µg/m³ | 2.60E-05 | m³/µg | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Bromodichloromethane | 2.73E-02 | µg/m³ | 1.03E-04 | µg/m³ | 3.70E-05 | m³/µg | 4E-09 | (2) | -- | -- | -- | -- |
| | | | | Chloroform | 3.20E-02 | µg/m³ | 1.21E-04 | µg/m³ | 2.30E-05 | m³/µg | 3E-09 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobutadiene | 1.21E-02 | µg/m³ | 4.56E-05 | µg/m³ | 2.20E-05 | m³/µg | 1E-09 | (2) | -- | -- | -- | -- |
| | | | | Trichloroethene | 3.19E-02 | µg/m³ | 1.63E-02 | µg/m³ | 4.10E-06 | m³/µg | 7E-08 | (2) | -- | -- | -- | -- |
| | | | | Vinyl Chloride | 4.22E-02 | µg/m³ | 5.72E-02 | µg/m³ | 4.40E-06 | m³/µg | 3E-07 | (2) | -- | -- | -- | -- |
| | | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | | | | |
| | | | | 1,1'-Biphenyl | 9.32E-03 | µg/m³ | 3.51E-05 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Benzo(a)anthracene | 2.87E-04 | µg/m³ | 2.83E-04 | µg/m³ | 6.00E-05 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | | Bis(2-chloroethyl)ether | 1.25E-03 | µg/m³ | 4.70E-06 | µg/m³ | 3.30E-04 | m³/µg | 2E-09 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorobenzene | 2.12E-02 | µg/m³ | 7.99E-05 | µg/m³ | 4.60E-04 | m³/µg | 4E-08 | (2) | -- | -- | -- | -- |
| | | | | Hexachlorocyclopentadiene | 9.64E-02 | µg/m³ | 3.63E-04 | µg/m³ | -- | -- | -- | (2) | -- | -- | -- | -- |
| | | | | Nitrobenzene | 1.84E-03 | µg/m³ | 6.92E-06 | µg/m³ | 4.00E-05 | m³/µg | 3E-10 | (2) | -- | -- | -- | -- |
| | | | | Dioxins/Furans | | | | | | | | | | | | |
| | | | | 2,3,7,8-TCDD TEQ | 1.08E-07 | µg/m³ | 4.06E-10 | µg/m³ | 3.80E+01 | m³/µg | 2E-08 | (2) | -- | -- | -- | -- |
| | | | Exp. Route Total | | | | | | | | 6E-05 | | | | | -- |
| | | Exp. Point Total | | | | | | | | | 6E-05 | | | | | -- |
| Medium Total | | | | | | | | | | | 4E-04 | | | | | -- |
| Notes: | | | | | | | | | | Total of Receptor Risks Across All Media | 4E-04 | | | Total of Receptor Hazards Across All Media | | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 7-27.DSA
Calculation of Chemical Cancer Risks and Non-Cancer Hazards
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk [1] | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient [1] |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |

(2) Cancer risk is only presented for the lifetime receptor, whereas non-cancer hazard is calculated separately for the child and adult receptor.

# Summary of Chemical Cancer Risks and Non-Cancer Hazards for Constituents of Interest: Data Sensitivity Analysis

Table 9-1.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.08 | 0.003 | -- | 0.08 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.08 | 0.003 | -- | 0.08 |
| | | Exposure Point Total | | | | | -- | | | | | 0.08 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.08 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.08 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 9E-11 | 9E-11 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-11 | 3E-11 | RS | -- | -- | 0.00003 | 0.00003 |
| | | | 1,1-Dichloroethane | -- | -- | 3E-12 | 3E-12 | UR | -- | -- | 0.00000001 | 0.00000001 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | -- | -- | 0.0000001 | 0.0000001 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | UR | -- | -- | 0.000002 | 0.000002 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 4E-09 | 4E-09 | RP | -- | -- | 0.00001 | 0.00001 |
| | | | 1,2-Dibromoethane | -- | -- | 8E-10 | 8E-10 | RS | -- | -- | 0.0000004 | 0.0000004 |
| | | | 1,2-Dichloropropane | -- | -- | 5E-12 | 5E-12 | RS | -- | -- | 0.000001 | 0.000001 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.00000001 | 0.00000001 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.00000002 | 0.00000002 |
| | | | 1,4-Dichlorobenzene | -- | -- | 1E-11 | 1E-11 | HP | -- | -- | 0.000000004 | 0.000000004 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000001 | 0.0000001 |
| | | | Bromodichloromethane | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Bromoform | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | NV; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Carbon Tetrachloride | -- | -- | 4E-11 | 4E-11 | HP | -- | -- | 0.0000002 | 0.0000002 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | -- | -- | 0.00000008 | 0.00000008 |
| | | | Chloromethane | -- | -- | 1E-11 | 1E-11 | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | cis-1,3-Dichloropropene | -- | -- | 1E-11 | 1E-11 | RS | -- | -- | 0.0000004 | 0.0000004 |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | -- | -- | 0.000007 | 0.000007 |
| | | | Hexachlorobutadiene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | 3E-13 | 3E-13 | HP; UR | -- | -- | 9E-10 | 9E-10 |

Table 9-1.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | -- | -- | 2E-14 | 2E-14 | HP | -- | -- | 0.000000009 | 0.000000009 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP; RS | -- | -- | 0.0000004 | 0.0000004 |
| | | | trans-1,3-Dichloropropene | -- | -- | 1E-11 | 1E-11 | RS | -- | -- | 0.0000005 | 0.0000005 |
| | | | Vinyl Chloride | -- | -- | 5E-11 | 5E-11 | HP | -- | -- | 0.0000003 | 0.0000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | 9E-11 | 9E-11 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Hexachloroethane | -- | -- | 2E-12 | 2E-12 | NV | -- | -- | 0.00000002 | 0.00000002 |
| | | | Nitrobenzene | -- | -- | 7E-13 | 7E-13 | NV; RS | -- | -- | 0.000000005 | 0.000000005 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | 6E-13 | 6E-13 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | 5E-11 | 5E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | -- | -- | 5E-11 | 5E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Chemical Total | -- | -- | 6E-09 | 6E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 6E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 6E-09 | | | | | 0.0001 |
| Notes: | | | | | | Receptor Risk Total | 6E-09 | | | | Receptor Hazard Index (HI) | 0.08 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.08 |
| Total Hepatic (HP) HI across All Media = | 0.000001 |
| Total Nervous (NV) HI across All Media = | 0.000003 |
| Total Other (OT) HI across All Media = | 0.000007 |
| Total Reproductive (RP) HI across All Media = | 0.00001 |
| Total Respiratory (RS) HI across All Media = | 0.00007 |
| Total Urinary (UR) HI across All Media = | 0.000002 |

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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.06 | 0.002 | -- | 0.07 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.06 | 0.002 | -- | 0.07 |
| | | Exposure Point Total | | | | | -- | | | | | 0.07 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.07 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.07 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 1E-09 | 7E-09 | -- | 8E-09 | OT | 0.000007 | 0.00005 | -- | 0.00006 |
| | | | 1,1,2-Trichloroethane | 2E-10 | 8E-10 | -- | 1E-09 | HP | 0.00006 | 0.0002 | -- | 0.0003 |
| | | | 1,1-Dichloroethane | 8E-12 | 4E-11 | -- | 5E-11 | UR | 0.00000005 | 0.0000003 | -- | 0.0000003 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | 0.00002 | 0.0001 | -- | 0.0002 |
| | | | 1,2,4-Trichlorobenzene | 8E-11 | 5E-09 | -- | 5E-09 | HP | 0.000002 | 0.0001 | -- | 0.0001 |
| | | | 1,2-Dibromo-3-chloropropane | 6E-09 | 5E-08 | -- | 6E-08 | RP | 0.0002 | 0.002 | -- | 0.003 |
| | | | 1,2-Dibromoethane | 7E-09 | 2E-08 | -- | 3E-08 | EN; HP; RP | 0.00003 | 0.00008 | -- | 0.0001 |
| | | | 1,2-Dichloropropane | 6E-12 | 3E-11 | -- | 4E-11 | MS | 0.000003 | 0.00002 | -- | 0.00002 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | HP | 0.0000001 | 0.000006 | -- | 0.000006 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | HP; UR | 0.000002 | 0.00008 | -- | 0.00008 |
| | | | 1,4-Dichlorobenzene | 8E-12 | 3E-10 | -- | 3E-10 | HP | 0.000002 | 0.00006 | -- | 0.00006 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.0001 | 0.0003 | -- | 0.0004 |
| | | | Bromodichloromethane | 7E-11 | 3E-10 | -- | 3E-10 | RP | 0.00001 | 0.00004 | -- | 0.00005 |
| | | | Bromoform | 3E-11 | 1E-10 | -- | 1E-10 | HP | 0.000008 | 0.00003 | -- | 0.00004 |
| | | | Bromomethane | -- | -- | -- | -- | GI | 0.00003 | 0.00008 | -- | 0.0001 |
| | | | Carbon Tetrachloride | 1E-10 | 2E-09 | -- | 2E-09 | HP | 0.00002 | 0.0003 | -- | 0.0003 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | 0.000001 | 0.00003 | -- | 0.00003 |
| | | | Chloromethane | 3E-11 | 7E-11 | -- | 1E-10 | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | 1E-10 | 6E-10 | -- | 7E-10 | GI | 0.000002 | 0.00001 | -- | 0.00001 |
| | | | Dibromochloromethane | 2E-10 | 5E-10 | -- | 7E-10 | HP | 0.000002 | 0.000006 | -- | 0.000008 |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | 0.000009 | 0.00007 | -- | 0.00008 |
| | | | Hexachlorobutadiene | 2E-11 | 3E-09 | -- | 3E-09 | UR | 0.00002 | 0.002 | -- | 0.002 |
| | | | Methyl Tertiary Butyl Ether | 4E-12 | 6E-12 | -- | 9E-12 | HP | 0.0000005 | 0.0000008 | -- | 0.000001 |

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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

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|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | 3E-12 | 9E-12 | -- | 1E-11 | HP | 0.000002 | 0.000006 | -- | 0.000008 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP | 0.0000009 | 0.000008 | -- | 0.000009 |
| | | | trans-1,3-Dichloropropene | 1E-10 | 9E-10 | -- | 1E-09 | GI | 0.000002 | 0.00002 | -- | 0.00002 |
| | | | Vinyl Chloride | 1E-09 | 8E-09 | -- | 1E-08 | HP | 0.00004 | 0.0003 | -- | 0.0003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | 1E-11 | 4E-10 | -- | 4E-10 | RP | 0.00006 | 0.002 | -- | 0.002 |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | OC | 0.000008 | 0.00002 | -- | 0.00002 |
| | | | 2,4-Dinitrotoluene | 2E-10 | 7E-10 | -- | 9E-10 | HM | 0.000007 | 0.00002 | -- | 0.00003 |
| | | | 2,6-Dinitrotoluene | 1E-09 | 4E-09 | -- | 5E-09 | OT | 0.000005 | 0.00002 | -- | 0.00002 |
| | | | 2-Nitrophenol | -- | -- | -- | -- | OC | 0.0009 | 0.0005 | -- | 0.001 |
| | | | 3,3-Dichlorobenzidine | 6E-10 | 1E-08 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 0.0003 | 0.0009 | -- | 0.001 |
| | | | 4-Chloroaniline | 6E-11 | 2E-10 | -- | 3E-10 | HM | 0.00004 | 0.0002 | -- | 0.0002 |
| | | | 4-Nitroaniline | 2E-11 | 4E-11 | -- | 7E-11 | IM | 0.000008 | 0.00002 | -- | 0.00002 |
| | | | 4-Nitrophenol | -- | -- | -- | -- | OC | 0.001 | 0.0006 | -- | 0.002 |
| | | | Atrazine | 6E-11 | 4E-10 | -- | 5E-10 | RP | 0.000007 | 0.00004 | -- | 0.00005 |
| | | | Bis(2-chloroethyl)ether | 5E-10 | 8E-10 | -- | 1E-09 | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | 4E-11 | -- | -- | 4E-11 | RP | 0.000002 | -- | -- | 0.000002 |
| | | | Butylbenzylphthalate | 5E-12 | 4E-10 | -- | 4E-10 | HP | 0.0000001 | 0.000008 | -- | 0.000008 |
| | | | Dibenz(a,h)anthracene | 4E-10 | -- | -- | 4E-10 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 9E-10 | -- | -- | 9E-10 | RP | 0.004 | -- | -- | 0.004 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | UR | 0.000002 | 0.0003 | -- | 0.0003 |
| | | | Hexachloroethane | 1E-11 | 6E-10 | -- | 7E-10 | HP | 0.000002 | 0.0001 | -- | 0.0001 |
| | | | Indeno(1,2,3-cd)pyrene | 5E-11 | -- | -- | 5E-11 | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 4E-09 | 8E-09 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | EN; HM; HP; UR | 0.000006 | 0.00003 | -- | 0.00004 |
| | | | Pentachlorophenol | 5E-10 | 1E-07 | -- | 1E-07 | RP | 0.00009 | 0.02 | -- | 0.02 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | 4E-11 | -- | -- | 4E-11 | UR | 0.000004 | -- | -- | 0.000004 |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | 7E-10 | 1E-07 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | 6E-10 | 9E-08 | -- | 9E-08 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | 2E-10 | -- | -- | 2E-10 | NV | 0.0002 | -- | -- | 0.0002 |
| | | | Aroclor 1260 | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | OT | 0.00002 | 0.00002 | -- | 0.00004 |
| | | | Chemical Total | 3E-08 | 4E-07 | -- | 5E-07 | | 0.007 | 0.03 | -- | 0.04 |
| | | Exposure Point Total | | | | | 5E-07 | | | | | 0.04 |
| | Exposure Medium Total | | | | | | 5E-07 | | | | | 0.04 |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Trench (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 1E-06 | 1E-06 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 2E-07 | 2E-07 | RS | -- | -- | 0.5 | 0.5 |
| | | | 1,1-Dichloroethane | -- | -- | 1E-08 | 1E-08 | UR | -- | -- | 0.0001 | 0.0001 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | RS | -- | -- | 0.2 | 0.2 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | UR | -- | -- | 0.03 | 0.03 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 1E-04 | 1E-04 | RP | -- | -- | 0.6 | 0.6 |
| | | | 1,2-Dibromoethane | -- | -- | 7E-06 | 7E-06 | RP | -- | -- | 0.4 | 0.4 |
| | | | 1,2-Dichloropropane | -- | -- | 3E-08 | 3E-08 | RS | -- | -- | 0.06 | 0.06 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.0002 | 0.0002 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.0003 | 0.0003 |
| | | | 1,4-Dichlorobenzene | -- | -- | 7E-08 | 7E-08 | HP | -- | -- | 0.0004 | 0.0004 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.06 | 0.06 |
| | | | Bromodichloromethane | -- | -- | 2E-07 | 2E-07 | UR | -- | -- | 0.02 | 0.02 |
| | | | Bromoform | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | RS | -- | -- | 0.009 | 0.009 |
| | | | Carbon Tetrachloride | -- | -- | 5E-08 | 5E-08 | HP | -- | -- | 0.003 | 0.003 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | -- | -- | 0.001 | 0.001 |
| | | | Chloromethane | -- | -- | 3E-08 | 3E-08 | NV | -- | -- | 0.0004 | 0.0004 |
| | | | cis-1,3-Dichloropropene | -- | -- | 2E-08 | 2E-08 | RS | -- | -- | 0.009 | 0.009 |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | -- | -- | 0.002 | 0.002 |
| | | | Hexachlorobutadiene | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | 3E-09 | 3E-09 | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Methylene Chloride | -- | -- | 1E-10 | 1E-10 | HP | -- | -- | 0.0007 | 0.0007 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP | -- | -- | 0.003 | 0.003 |
| | | | trans-1,3-Dichloropropene | -- | -- | 3E-08 | 3E-08 | RS | -- | -- | 0.01 | 0.01 |
| | | | Vinyl Chloride | -- | -- | 1E-12 | 1E-12 | HP | -- | -- | 0.0000002 | 0.0000002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | 2E-07 | 2E-07 | OT | -- | -- | 0.0003 | 0.0003 |
| | | | Hexachlorobenzene | -- | -- | 8E-07 | 8E-07 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.005 | 0.005 |
| | | | Hexachloroethane | -- | -- | 1E-08 | 1E-08 | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Nitrobenzene | -- | -- | 3E-08 | 3E-08 | EN; HM; HP; UR | -- | -- | 0.002 | 0.002 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Aroclor 1232 | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | 4 | 4 |
| | | | Chemical Total | -- | -- | 1E-04 | 1E-04 | | -- | -- | 6 | 6 |
| | | Exposure Point Total | | | | | 1E-04 | | | | | 6 |
| | Exposure Medium Total | | | | | | 1E-04 | | | | | 6 |
| Medium Total | | | | | | | 1E-04 | | | | | 6 |
| Notes: | | | | | | Receptor Risk Total | 1E-04 | | | | Receptor Hazard Index (HI) | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.07 |
| Total Endocrine (EN) HI across All Media = | 0.004 |
| Total Gastrointestinal (GI) HI across All Media = | 0.0001 |
| Total Hematological (HM) HI across All Media = | 0.003 |
| Total Hepatic (HP) HI across All Media = | 0.01 |
| Total Immune (IM) HI across All Media = | 0.00002 |
| Total Musculoskeletal (MS) HI across All Media = | 0.00002 |
| Total Nervous (NV) HI across All Media = | 0.06 |
| Total Ocular (OC) HI across All Media = | 0.004 |
| Total Other (OT) HI across All Media = | 0.003 |
| Total Reproductive (RP) HI across All Media = | 1 |
| Total Respiratory (RS) HI across All Media = | 0.8 |
| Total Urinary (UR) HI across All Media = | 0.06 |

Table 9-3.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 1 | 0.03 | -- | 1 |
| | | | Chemical Total | -- | -- | -- | -- | | 1 | 0.03 | -- | 1 |
| | | Exposure Point Total | | | | | -- | | | | | 1 |
| | Exposure Medium Total | | | | | | -- | | | | | 1 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 1 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.01 | 0.001 | -- | 0.01 |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.03 | 0.002 | -- | 0.03 |
| | | | 1,1-Dichloroethane | -- | -- | -- | -- | UR | 0.0003 | 0.00002 | -- | 0.0003 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | 0.002 | 0.0002 | -- | 0.002 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | EN | 0.01 | 0.01 | -- | 0.02 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 1 | 0.2 | -- | 2 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.01 | 0.0007 | -- | 0.02 |
| | | | 1,2-Dichloropropane | -- | -- | -- | -- | MS | 0.001 | 0.0001 | -- | 0.002 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | 0.0006 | 0.0003 | -- | 0.0009 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | HP | 0.004 | 0.002 | -- | 0.006 |
| | | | 1,4-Dichlorobenzene | -- | -- | -- | -- | HP | 0.0009 | 0.0005 | -- | 0.001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.06 | 0.002 | -- | 0.07 |
| | | | Bromodichloromethane | -- | -- | -- | -- | UR | 0.002 | 0.0001 | -- | 0.002 |
| | | | Bromoform | -- | -- | -- | -- | HP | 0.007 | 0.0004 | -- | 0.007 |
| | | | Bromomethane | -- | -- | -- | -- | GI | 0.07 | 0.002 | -- | 0.07 |
| | | | Carbon Tetrachloride | -- | -- | -- | -- | HM | 0.02 | 0.004 | -- | 0.02 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP | 0.003 | 0.0009 | -- | 0.004 |
| | | | Chloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.001 | 0.0001 | -- | 0.001 |
| | | | Dibromochloromethane | -- | -- | -- | -- | HP | 0.003 | 0.0002 | -- | 0.004 |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | 0.001 | 0.0001 | -- | 0.001 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.01 | 0.02 | -- | 0.03 |
| | | | Methyl Tertiary Butyl Ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-3.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | -- | -- | -- | -- | HP | 0.01 | 0.0004 | -- | 0.01 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | IM | 0.005 | 0.0006 | -- | 0.006 |
| | | | trans-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.002 | 0.0002 | -- | 0.002 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.02 | 0.002 | -- | 0.03 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | -- | -- | -- | -- | RP | 0.03 | 0.02 | -- | 0.06 |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | OC | 0.04 | 0.001 | -- | 0.05 |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.01 | 0.0007 | -- | 0.01 |
| | | | 2,6-Dinitrotoluene | -- | -- | -- | -- | IM | 0.09 | 0.006 | -- | 0.1 |
| | | | 2-Nitrophenol | -- | -- | -- | -- | OC | 0.5 | 0.005 | -- | 0.5 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 1 | 0.09 | -- | 1 |
| | | | 4-Chloroaniline | -- | -- | -- | -- | IM | 0.003 | 0.0002 | -- | 0.003 |
| | | | 4-Nitroaniline | -- | -- | -- | -- | IM | 0.01 | 0.0003 | -- | 0.01 |
| | | | 4-Nitrophenol | -- | -- | -- | -- | OC | 0.5 | 0.005 | -- | 0.6 |
| | | | Atrazine | -- | -- | -- | -- | OT | 0.0003 | 0.00004 | -- | 0.0003 |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | HP | 0.006 | -- | -- | 0.006 |
| | | | Butylbenzylphthalate | -- | -- | -- | -- | HP | 0.0006 | 0.0008 | -- | 0.001 |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.03 | -- | -- | 0.03 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | GI | 0.01 | 0.04 | -- | 0.06 |
| | | | Hexachloroethane | -- | -- | -- | -- | UR | 0.02 | 0.02 | -- | 0.03 |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | HM | 0.009 | 0.0006 | -- | 0.009 |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.01 | 0.04 | -- | 0.05 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | -- | -- | HP | 0.003 | -- | -- | 0.003 |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | -- | -- | OT | 0.1 | -- | -- | 0.1 |
| | | | Aroclor 1260 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | RP | 0.4 | 0.003 | -- | 0.4 |
| | | | Chemical Total | -- | -- | -- | -- | | 5 | 0.5 | -- | 5 |
| | | Exposure Point Total | | | | | -- | | | | | 5 |
| | Exposure Medium Total | | | | | | -- | | | | | 5 |

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Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 7 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 1 |
| Total Endocrine (EN) HI across All Media = | 2 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.08 |
| Total Hepatic (HP) HI across All Media = | 0.2 |
| Total Immune (IM) HI across All Media = | 0.2 |
| Total Musculoskeletal (MS) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.08 |
| Total Ocular (OC) HI across All Media = | 3 |
| Total Other (OT) HI across All Media = | 0.2 |
| Total Reproductive (RP) HI across All Media = | 2 |
| Total Urinary (UR) HI across All Media = | 0.07 |

Table 9-4.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.1 | 0.005 | -- | 0.1 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.1 | 0.005 | -- | 0.1 |
| | | Exposure Point Total | | | | | -- | | | | | 0.1 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.1 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.1 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.006 | 0.0007 | -- | 0.007 |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.02 | 0.001 | -- | 0.02 |
| | | | 1,1-Dichloroethane | -- | -- | -- | -- | UR | 0.0002 | 0.00001 | -- | 0.0002 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | 0.001 | 0.0001 | -- | 0.001 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | EN | 0.006 | 0.008 | -- | 0.01 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 0.8 | 0.2 | -- | 1 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.009 | 0.0005 | -- | 0.009 |
| | | | 1,2-Dichloropropane | -- | -- | -- | -- | MS | 0.0009 | 0.00008 | -- | 0.001 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | 0.0003 | 0.0002 | -- | 0.0006 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | HP | 0.002 | 0.002 | -- | 0.004 |
| | | | 1,4-Dichlorobenzene | -- | -- | -- | -- | HP | 0.0005 | 0.0004 | -- | 0.0009 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.04 | 0.002 | -- | 0.04 |
| | | | Bromodichloromethane | -- | -- | -- | -- | UR | 0.001 | 0.00009 | -- | 0.001 |
| | | | Bromoform | -- | -- | -- | -- | HP | 0.004 | 0.0003 | -- | 0.004 |
| | | | Bromomethane | -- | -- | -- | -- | GI | 0.04 | 0.001 | -- | 0.04 |
| | | | Carbon Tetrachloride | -- | -- | -- | -- | HM | 0.01 | 0.003 | -- | 0.01 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP | 0.002 | 0.0006 | -- | 0.002 |
| | | | Chloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.0007 | 0.00008 | -- | 0.0008 |
| | | | Dibromochloromethane | -- | -- | -- | -- | HP | 0.002 | 0.0001 | -- | 0.002 |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | 0.0007 | 0.00009 | -- | 0.0008 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.007 | 0.02 | -- | 0.02 |
| | | | Methyl Tertiary Butyl Ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |

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Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | -- | -- | -- | -- | HP | 0.007 | 0.0002 | -- | 0.007 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | IM | 0.003 | 0.0004 | -- | 0.004 |
| | | | trans-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.001 | 0.0001 | -- | 0.001 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.01 | 0.001 | -- | 0.02 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | -- | -- | -- | -- | RP | 0.02 | 0.02 | -- | 0.04 |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | OC | 0.03 | 0.001 | -- | 0.03 |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.008 | 0.0005 | -- | 0.009 |
| | | | 2,6-Dinitrotoluene | -- | -- | -- | -- | IM | 0.05 | 0.004 | -- | 0.06 |
| | | | 2-Nitrophenol | -- | -- | -- | -- | OC | 0.3 | 0.003 | -- | 0.3 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 0.8 | 0.06 | -- | 0.9 |
| | | | 4-Chloroaniline | -- | -- | -- | -- | IM | 0.002 | 0.0001 | -- | 0.002 |
| | | | 4-Nitroaniline | -- | -- | -- | -- | IM | 0.007 | 0.0002 | -- | 0.007 |
| | | | 4-Nitrophenol | -- | -- | -- | -- | OC | 0.3 | 0.004 | -- | 0.3 |
| | | | Atrazine | -- | -- | -- | -- | OT | 0.0002 | 0.00002 | -- | 0.0002 |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | HP | 0.003 | -- | -- | 0.003 |
| | | | Butylbenzylphthalate | -- | -- | -- | -- | HP | 0.0003 | 0.0005 | -- | 0.0009 |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.02 | -- | -- | 0.02 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | GI | 0.009 | 0.03 | -- | 0.04 |
| | | | Hexachloroethane | -- | -- | -- | -- | UR | 0.009 | 0.01 | -- | 0.02 |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | HM | 0.005 | 0.0004 | -- | 0.006 |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.006 | 0.02 | -- | 0.03 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | -- | -- | HP | 0.002 | -- | -- | 0.002 |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | -- | -- | OT | 0.09 | -- | -- | 0.09 |
| | | | Aroclor 1260 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | RP | 0.2 | 0.002 | -- | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | 3 | 0.3 | -- | 3 |
| | | Exposure Point Total | | | | | -- | | | | | 3 |
| | Exposure Medium Total | | | | | | -- | | | | | 3 |

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Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.01 | 0.01 |
| | | | 1,1-Dichloroethane | -- | -- | -- | -- | UR | -- | -- | 0.000003 | 0.000003 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | -- | -- | 0.00001 | 0.00001 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | UR | -- | -- | 0.0008 | 0.0008 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | -- | -- | 0.01 | 0.01 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | RS | -- | -- | 0.0002 | 0.0002 |
| | | | 1,2-Dichloropropane | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.000005 | 0.000005 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.000007 | 0.000007 |
| | | | 1,4-Dichlorobenzene | -- | -- | -- | -- | HP | -- | -- | 0.000001 | 0.000001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00009 | 0.00009 |
| | | | Bromodichloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromoform | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | NV; RS | -- | -- | 0.0004 | 0.0004 |
| | | | Carbon Tetrachloride | -- | -- | -- | -- | HP | -- | -- | 0.00001 | 0.00001 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | -- | -- | 0.00002 | 0.00002 |
| | | | Chloromethane | -- | -- | -- | -- | NV | -- | -- | 0.00003 | 0.00003 |
| | | | cis-1,3-Dichloropropene | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | -- | -- | 0.00006 | 0.00006 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | -- | -- | HP; UR | -- | -- | 0.0000005 | 0.0000005 |
| | | | Methylene Chloride | -- | -- | -- | -- | HP | -- | -- | 0.000003 | 0.000003 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP; RS | -- | -- | 0.00006 | 0.00006 |
| | | | trans-1,3-Dichloropropene | -- | -- | -- | -- | RS | -- | -- | 0.00005 | 0.00005 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | -- | -- | 0.00002 | 0.00002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.007 | 0.007 |
| | | | Hexachloroethane | -- | -- | -- | -- | NV | -- | -- | 0.000006 | 0.000006 |
| | | | Nitrobenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-4.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Aroclor 1232 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | 0.005 | 0.005 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.03 | 0.03 |
| | | Exposure Point Total | | | | | -- | | | | | 0.03 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | -- | | | | | 3 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.1 |
| Total Endocrine (EN) HI across All Media = | 0.9 |
| Total Gastrointestinal (GI) HI across All Media = | 0.08 |
| Total Hematological (HM) HI across All Media = | 0.05 |
| Total Hepatic (HP) HI across All Media = | 0.1 |
| Total Immune (IM) HI across All Media = | 0.09 |
| Total Musculoskeletal (MS) HI across All Media = | 0.001 |
| Total Nervous (NV) HI across All Media = | 0.05 |
| Total Ocular (OC) HI across All Media = | 2 |
| Total Other (OT) HI across All Media = | 0.09 |
| Total Reproductive (RP) HI across All Media = | 1 |
| Total Respiratory (RS) HI across All Media = | 0.02 |
| Total Urinary (UR) HI across All Media = | 0.04 |

Table 9-5.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | -- |
| Groundwater | Groundwater | Groundwater | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 1E-05 | 1E-06 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethane | 8E-08 | 6E-09 | -- | 9E-08 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,2,4-Trichlorobenzene | 8E-07 | 1E-06 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | 2E-04 | 3E-05 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | 7E-05 | 4E-06 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichloropropane | 6E-08 | 5E-09 | -- | 6E-08 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,4-Dichlorobenzene | 8E-08 | 6E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromodichloromethane | 7E-07 | 5E-08 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Bromoform | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Carbon Tetrachloride | 1E-06 | 3E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Chlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chloromethane | 3E-07 | 8E-09 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | 1E-06 | 1E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Dibromochloromethane | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | 2E-07 | 5E-07 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | 4E-08 | 8E-10 | -- | 4E-08 | -- | -- | -- | -- | -- |

Table 9-5.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | 1E-07 | 4E-09 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | trans-1,3-Dichloropropene | 1E-06 | 1E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | 7E-05 | 5E-06 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | 1E-07 | 7E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 2,4-Dinitrotoluene | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 2,6-Dinitrotoluene | 1E-05 | 7E-07 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | 2-Nitrophenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 3,3-Dichlorobenzidine | 6E-06 | 2E-06 | -- | 9E-06 | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4-Chloroaniline | 6E-07 | 4E-08 | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | 4-Nitroaniline | 2E-07 | 7E-09 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | 4-Nitrophenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Atrazine | 6E-07 | 8E-08 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | 5E-06 | 1E-07 | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | 4E-07 | -- | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Butylbenzylphthalate | 5E-08 | 8E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-05 | -- | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 9E-06 | -- | -- | 9E-06 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachloroethane | 1E-07 | 1E-07 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 4E-05 | 1E-06 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | 5E-06 | 2E-05 | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | 4E-07 | -- | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | 7E-06 | 2E-05 | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | 6E-06 | 2E-05 | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 4E-04 | 1E-04 | -- | 6E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 6E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 6E-04 | | | | | -- |

Table 9-5.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethane | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 9E-04 | 9E-04 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | -- | -- | 3E-07 | 3E-07 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichloropropane | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,4-Dichlorobenzene | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromodichloromethane | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Bromoform | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Carbon Tetrachloride | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Chlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chloromethane | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | -- | -- | 9E-10 | 9E-10 | -- | -- | -- | -- | -- |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Methylene Chloride | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | trans-1,3-Dichloropropene | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | -- | -- | 9E-07 | 9E-07 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachloroethane | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |

Table 9-5.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Aroclor 1232 | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | 7E-09 | 7E-09 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | 7E-09 | 7E-09 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 9E-04 | 9E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 9E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | 1E-03 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 1E-03 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-6.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.06 | 0.003 | -- | 0.06 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.06 | 0.003 | -- | 0.06 |
| | | Exposure Point Total | | | | | -- | | | | | 0.06 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.06 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.06 |
| Groundwater | Outdoor Air | Outdoor Air | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 9E-11 | 9E-11 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 3E-11 | 3E-11 | RS | -- | -- | 0.00003 | 0.00003 |
| | | | 1,1-Dichloroethane | -- | -- | 3E-12 | 3E-12 | UR | -- | -- | 0.00000001 | 0.00000001 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | -- | -- | 0.0000001 | 0.0000001 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | UR | -- | -- | 0.000002 | 0.000002 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 4E-09 | 4E-09 | RP | -- | -- | 0.00001 | 0.00001 |
| | | | 1,2-Dibromoethane | -- | -- | 8E-10 | 8E-10 | RS | -- | -- | 0.0000004 | 0.0000004 |
| | | | 1,2-Dichloropropane | -- | -- | 5E-12 | 5E-12 | RS | -- | -- | 0.000001 | 0.000001 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.00000001 | 0.00000001 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.00000002 | 0.00000002 |
| | | | 1,4-Dichlorobenzene | -- | -- | 1E-11 | 1E-11 | HP | -- | -- | 0.000000004 | 0.000000004 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.0000001 | 0.0000001 |
| | | | Bromodichloromethane | -- | -- | 3E-11 | 3E-11 | -- | -- | -- | -- | -- |
| | | | Bromoform | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | NV; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Carbon Tetrachloride | -- | -- | 4E-11 | 4E-11 | HP | -- | -- | 0.0000002 | 0.0000002 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | -- | -- | 0.00000008 | 0.00000008 |
| | | | Chloromethane | -- | -- | 1E-11 | 1E-11 | NV | -- | -- | 0.0000002 | 0.0000002 |
| | | | cis-1,3-Dichloropropene | -- | -- | 1E-11 | 1E-11 | RS | -- | -- | 0.0000004 | 0.0000004 |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | -- | -- | 0.000007 | 0.000007 |
| | | | Hexachlorobutadiene | -- | -- | 5E-12 | 5E-12 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | 3E-13 | 3E-13 | HP; UR | -- | -- | 9E-10 | 9E-10 |

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Future On-Site Indoor/Outdoor Commercial Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Indoor/Outdoor Commercial Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | -- | -- | 2E-14 | 2E-14 | HP | -- | -- | 0.000000009 | 0.000000009 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP; RS | -- | -- | 0.0000004 | 0.0000004 |
| | | | trans-1,3-Dichloropropene | -- | -- | 1E-11 | 1E-11 | RS | -- | -- | 0.0000005 | 0.0000005 |
| | | | Vinyl Chloride | -- | -- | 5E-11 | 5E-11 | HP | -- | -- | 0.0000003 | 0.0000003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | 9E-11 | 9E-11 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Hexachloroethane | -- | -- | 2E-12 | 2E-12 | NV | -- | -- | 0.00000002 | 0.00000002 |
| | | | Nitrobenzene | -- | -- | 7E-13 | 7E-13 | NV; RS | -- | -- | 0.000000005 | 0.000000005 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | 6E-13 | 6E-13 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | 5E-11 | 5E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | -- | -- | 5E-11 | 5E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | 1E-11 | 1E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | 3E-12 | 3E-12 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | 2E-11 | 2E-11 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | 0.00001 | 0.00001 |
| | | | Chemical Total | -- | -- | 6E-09 | 6E-09 | | -- | -- | 0.0001 | 0.0001 |
| | | Exposure Point Total | | | | | 6E-09 | | | | | 0.0001 |
| | Exposure Medium Total | | | | | | 6E-09 | | | | | 0.0001 |
| Medium Total | | | | | | | 6E-09 | | | | | 0.0001 |
| | | | | | | Receptor Risk Total | 6E-09 | | | | Receptor Hazard Index (HI) | 0.06 |

Notes:
(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.06 |
| Total Hepatic (HP) HI across All Media = | 0.000001 |
| Total Nervous (NV) HI across All Media = | 0.000003 |
| Total Other (OT) HI across All Media = | 0.000007 |
| Total Reproductive (RP) HI across All Media = | 0.00001 |
| Total Respiratory (RS) HI across All Media = | 0.00007 |
| Total Urinary (UR) HI across All Media = | 0.000002 |

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Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.05 | 0.002 | -- | 0.05 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.002 | -- | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.05 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 1E-09 | 7E-09 | -- | 8E-09 | OT | 0.000007 | 0.00005 | -- | 0.00006 |
| | | | 1,1,2-Trichloroethane | 2E-10 | 8E-10 | -- | 1E-09 | HP | 0.00006 | 0.0002 | -- | 0.0003 |
| | | | 1,1-Dichloroethane | 8E-12 | 4E-11 | -- | 5E-11 | UR | 0.00000005 | 0.0000003 | -- | 0.0000003 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | 0.00002 | 0.0001 | -- | 0.0002 |
| | | | 1,2,4-Trichlorobenzene | 8E-11 | 5E-09 | -- | 5E-09 | HP | 0.000002 | 0.0001 | -- | 0.0001 |
| | | | 1,2-Dibromo-3-chloropropane | 6E-09 | 5E-08 | -- | 6E-08 | RP | 0.0002 | 0.002 | -- | 0.003 |
| | | | 1,2-Dibromoethane | 7E-09 | 2E-08 | -- | 3E-08 | EN; HP; RP | 0.00003 | 0.00008 | -- | 0.0001 |
| | | | 1,2-Dichloropropane | 6E-12 | 3E-11 | -- | 4E-11 | MS | 0.000003 | 0.00002 | -- | 0.00002 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | HP | 0.0000001 | 0.000006 | -- | 0.000006 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | HP; UR | 0.000002 | 0.00008 | -- | 0.00008 |
| | | | 1,4-Dichlorobenzene | 8E-12 | 3E-10 | -- | 3E-10 | HP | 0.000002 | 0.00006 | -- | 0.00006 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.0001 | 0.0003 | -- | 0.0004 |
| | | | Bromodichloromethane | 7E-11 | 3E-10 | -- | 3E-10 | RP | 0.00001 | 0.00004 | -- | 0.00005 |
| | | | Bromoform | 3E-11 | 1E-10 | -- | 1E-10 | HP | 0.000008 | 0.00003 | -- | 0.00004 |
| | | | Bromomethane | -- | -- | -- | -- | GI | 0.00003 | 0.00008 | -- | 0.0001 |
| | | | Carbon Tetrachloride | 1E-10 | 2E-09 | -- | 2E-09 | HP | 0.00002 | 0.0003 | -- | 0.0003 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | 0.000001 | 0.00003 | -- | 0.00003 |
| | | | Chloromethane | 3E-11 | 7E-11 | -- | 1E-10 | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | 1E-10 | 6E-10 | -- | 7E-10 | GI | 0.000002 | 0.00001 | -- | 0.00001 |
| | | | Dibromochloromethane | 2E-10 | 5E-10 | -- | 7E-10 | HP | 0.000002 | 0.000006 | -- | 0.000008 |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | 0.000009 | 0.00007 | -- | 0.00008 |
| | | | Hexachlorobutadiene | 2E-11 | 3E-09 | -- | 3E-09 | UR | 0.00002 | 0.002 | -- | 0.002 |
| | | | Methyl Tertiary Butyl Ether | 4E-12 | 6E-12 | -- | 9E-12 | HP | 0.0000005 | 0.0000008 | -- | 0.000001 |

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| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | 3E-12 | 9E-12 | -- | 1E-11 | HP | 0.000002 | 0.000006 | -- | 0.000008 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP | 0.0000009 | 0.000008 | -- | 0.000009 |
| | | | trans-1,3-Dichloropropene | 1E-10 | 9E-10 | -- | 1E-09 | GI | 0.000002 | 0.00002 | -- | 0.00002 |
| | | | Vinyl Chloride | 1E-09 | 8E-09 | -- | 1E-08 | HP | 0.00004 | 0.0003 | -- | 0.0003 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | 1E-11 | 4E-10 | -- | 4E-10 | RP | 0.00006 | 0.002 | -- | 0.002 |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | OC | 0.000008 | 0.00002 | -- | 0.00002 |
| | | | 2,4-Dinitrotoluene | 2E-10 | 7E-10 | -- | 9E-10 | HM | 0.000007 | 0.00002 | -- | 0.00003 |
| | | | 2,6-Dinitrotoluene | 1E-09 | 4E-09 | -- | 5E-09 | OT | 0.000005 | 0.00002 | -- | 0.00002 |
| | | | 2-Nitrophenol | -- | -- | -- | -- | OC | 0.0009 | 0.0005 | -- | 0.001 |
| | | | 3,3-Dichlorobenzidine | 6E-10 | 1E-08 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 0.0003 | 0.0009 | -- | 0.001 |
| | | | 4-Chloroaniline | 6E-11 | 2E-10 | -- | 3E-10 | HM | 0.00004 | 0.0002 | -- | 0.0002 |
| | | | 4-Nitroaniline | 2E-11 | 4E-11 | -- | 7E-11 | IM | 0.000008 | 0.00002 | -- | 0.00002 |
| | | | 4-Nitrophenol | -- | -- | -- | -- | OC | 0.001 | 0.0006 | -- | 0.002 |
| | | | Atrazine | 6E-11 | 4E-10 | -- | 5E-10 | RP | 0.000007 | 0.00004 | -- | 0.00005 |
| | | | Bis(2-chloroethyl)ether | 5E-10 | 8E-10 | -- | 1E-09 | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | 4E-11 | -- | -- | 4E-11 | RP | 0.000002 | -- | -- | 0.000002 |
| | | | Butylbenzylphthalate | 5E-12 | 4E-10 | -- | 4E-10 | HP | 0.0000001 | 0.000008 | -- | 0.000008 |
| | | | Dibenz(a,h)anthracene | 4E-10 | -- | -- | 4E-10 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 9E-10 | -- | -- | 9E-10 | RP | 0.004 | -- | -- | 0.004 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | UR | 0.000002 | 0.0003 | -- | 0.0003 |
| | | | Hexachloroethane | 1E-11 | 6E-10 | -- | 7E-10 | HP | 0.000002 | 0.0001 | -- | 0.0001 |
| | | | Indeno(1,2,3-cd)pyrene | 5E-11 | -- | -- | 5E-11 | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 4E-09 | 8E-09 | -- | 1E-08 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | EN; HM; HP; UR | 0.000006 | 0.00003 | -- | 0.00004 |
| | | | Pentachlorophenol | 5E-10 | 1E-07 | -- | 1E-07 | RP | 0.00009 | 0.02 | -- | 0.02 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | 4E-11 | -- | -- | 4E-11 | UR | 0.000004 | -- | -- | 0.000004 |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | 7E-10 | 1E-07 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | 6E-10 | 9E-08 | -- | 9E-08 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | 2E-10 | -- | -- | 2E-10 | NV | 0.0002 | -- | -- | 0.0002 |
| | | | Aroclor 1260 | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | OT | 0.00002 | 0.00002 | -- | 0.00004 |
| | | | Chemical Total | 3E-08 | 4E-07 | -- | 5E-07 | | 0.007 | 0.03 | -- | 0.04 |
| | | Exposure Point Total | | | | | 5E-07 | | | | | 0.04 |
| | Exposure Medium Total | | | | | | 5E-07 | | | | | 0.04 |

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| Scenario Timeframe: | Future |
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| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Outdoor Air | Trench (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 1E-06 | 1E-06 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 2E-07 | 2E-07 | RS | -- | -- | 0.5 | 0.5 |
| | | | 1,1-Dichloroethane | -- | -- | 1E-08 | 1E-08 | UR | -- | -- | 0.0001 | 0.0001 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | RS | -- | -- | 0.2 | 0.2 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | UR | -- | -- | 0.03 | 0.03 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 1E-04 | 1E-04 | RP | -- | -- | 0.6 | 0.6 |
| | | | 1,2-Dibromoethane | -- | -- | 7E-06 | 7E-06 | RP | -- | -- | 0.4 | 0.4 |
| | | | 1,2-Dichloropropane | -- | -- | 3E-08 | 3E-08 | RS | -- | -- | 0.06 | 0.06 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.0002 | 0.0002 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.0003 | 0.0003 |
| | | | 1,4-Dichlorobenzene | -- | -- | 7E-08 | 7E-08 | HP | -- | -- | 0.0004 | 0.0004 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.06 | 0.06 |
| | | | Bromodichloromethane | -- | -- | 2E-07 | 2E-07 | UR | -- | -- | 0.02 | 0.02 |
| | | | Bromoform | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | RS | -- | -- | 0.009 | 0.009 |
| | | | Carbon Tetrachloride | -- | -- | 5E-08 | 5E-08 | HP | -- | -- | 0.003 | 0.003 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | -- | -- | 0.001 | 0.001 |
| | | | Chloromethane | -- | -- | 3E-08 | 3E-08 | NV | -- | -- | 0.0004 | 0.0004 |
| | | | cis-1,3-Dichloropropene | -- | -- | 2E-08 | 2E-08 | RS | -- | -- | 0.009 | 0.009 |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | -- | -- | 0.002 | 0.002 |
| | | | Hexachlorobutadiene | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | 3E-09 | 3E-09 | NV | -- | -- | 0.0003 | 0.0003 |
| | | | Methylene Chloride | -- | -- | 1E-10 | 1E-10 | HP | -- | -- | 0.0007 | 0.0007 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP | -- | -- | 0.003 | 0.003 |
| | | | trans-1,3-Dichloropropene | -- | -- | 3E-08 | 3E-08 | RS | -- | -- | 0.01 | 0.01 |
| | | | Vinyl Chloride | -- | -- | 1E-12 | 1E-12 | HP | -- | -- | 0.0000002 | 0.0000002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | 2E-07 | 2E-07 | OT | -- | -- | 0.0003 | 0.0003 |
| | | | Hexachlorobenzene | -- | -- | 8E-07 | 8E-07 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.005 | 0.005 |
| | | | Hexachloroethane | -- | -- | 1E-08 | 1E-08 | NV | -- | -- | 0.000001 | 0.000001 |
| | | | Nitrobenzene | -- | -- | 3E-08 | 3E-08 | EN; HM; HP; UR | -- | -- | 0.002 | 0.002 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | 1E-12 | 1E-12 | -- | -- | -- | -- | -- |

Table 9-7.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Construction Worker - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Construction Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Aroclor 1232 | -- | -- | 5E-07 | 5E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | 2E-07 | 2E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | 1E-07 | 1E-07 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | 4 | 4 |
| | | | Chemical Total | -- | -- | 1E-04 | 1E-04 | | -- | -- | 6 | 6 |
| | | Exposure Point Total | | | | | 1E-04 | | | | | 6 |
| | Exposure Medium Total | | | | | | 1E-04 | | | | | 6 |
| Medium Total | | | | | | | 1E-04 | | | | | 6 |
| Notes: | | | | | | Receptor Risk Total | 1E-04 | | | | Receptor Hazard Index (HI) | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.05 |
| Total Endocrine (EN) HI across All Media = | 0.004 |
| Total Gastrointestinal (GI) HI across All Media = | 0.0001 |
| Total Hematological (HM) HI across All Media = | 0.003 |
| Total Hepatic (HP) HI across All Media = | 0.01 |
| Total Immune (IM) HI across All Media = | 0.00002 |
| Total Musculoskeletal (MS) HI across All Media = | 0.00002 |
| Total Nervous (NV) HI across All Media = | 0.06 |
| Total Ocular (OC) HI across All Media = | 0.004 |
| Total Other (OT) HI across All Media = | 0.003 |
| Total Reproductive (RP) HI across All Media = | 1 |
| Total Respiratory (RS) HI across All Media = | 0.8 |
| Total Urinary (UR) HI across All Media = | 0.06 |

Table 9-8.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.9 | 0.02 | -- | 0.9 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.9 | 0.02 | -- | 0.9 |
| | | Exposure Point Total | | | | | -- | | | | | 0.9 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.9 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.9 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.01 | 0.001 | -- | 0.01 |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.03 | 0.002 | -- | 0.03 |
| | | | 1,1-Dichloroethane | -- | -- | -- | -- | UR | 0.0003 | 0.00002 | -- | 0.0003 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | 0.002 | 0.0002 | -- | 0.002 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | EN | 0.01 | 0.01 | -- | 0.02 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 1 | 0.2 | -- | 2 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.01 | 0.0007 | -- | 0.02 |
| | | | 1,2-Dichloropropane | -- | -- | -- | -- | MS | 0.001 | 0.0001 | -- | 0.002 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | 0.0006 | 0.0003 | -- | 0.0009 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | HP | 0.004 | 0.002 | -- | 0.006 |
| | | | 1,4-Dichlorobenzene | -- | -- | -- | -- | HP | 0.0009 | 0.0005 | -- | 0.001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.06 | 0.002 | -- | 0.07 |
| | | | Bromodichloromethane | -- | -- | -- | -- | UR | 0.002 | 0.0001 | -- | 0.002 |
| | | | Bromoform | -- | -- | -- | -- | HP | 0.007 | 0.0004 | -- | 0.007 |
| | | | Bromomethane | -- | -- | -- | -- | GI | 0.07 | 0.002 | -- | 0.07 |
| | | | Carbon Tetrachloride | -- | -- | -- | -- | HM | 0.02 | 0.004 | -- | 0.02 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP | 0.003 | 0.0009 | -- | 0.004 |
| | | | Chloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.001 | 0.0001 | -- | 0.001 |
| | | | Dibromochloromethane | -- | -- | -- | -- | HP | 0.003 | 0.0002 | -- | 0.004 |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | 0.001 | 0.0001 | -- | 0.001 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.01 | 0.02 | -- | 0.03 |
| | | | Methyl Tertiary Butyl Ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-8.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | -- | -- | -- | -- | HP | 0.01 | 0.0004 | -- | 0.01 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | IM | 0.005 | 0.0006 | -- | 0.006 |
| | | | trans-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.002 | 0.0002 | -- | 0.002 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.02 | 0.002 | -- | 0.03 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | -- | -- | -- | -- | RP | 0.03 | 0.02 | -- | 0.06 |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | OC | 0.04 | 0.001 | -- | 0.05 |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.01 | 0.0007 | -- | 0.01 |
| | | | 2,6-Dinitrotoluene | -- | -- | -- | -- | IM | 0.09 | 0.006 | -- | 0.1 |
| | | | 2-Nitrophenol | -- | -- | -- | -- | OC | 0.5 | 0.005 | -- | 0.5 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 1 | 0.09 | -- | 1 |
| | | | 4-Chloroaniline | -- | -- | -- | -- | IM | 0.003 | 0.0002 | -- | 0.003 |
| | | | 4-Nitroaniline | -- | -- | -- | -- | IM | 0.01 | 0.0003 | -- | 0.01 |
| | | | 4-Nitrophenol | -- | -- | -- | -- | OC | 0.5 | 0.005 | -- | 0.6 |
| | | | Atrazine | -- | -- | -- | -- | OT | 0.0003 | 0.00004 | -- | 0.0003 |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | HP | 0.006 | -- | -- | 0.006 |
| | | | Butylbenzylphthalate | -- | -- | -- | -- | HP | 0.0006 | 0.0008 | -- | 0.001 |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.03 | -- | -- | 0.03 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | GI | 0.01 | 0.04 | -- | 0.06 |
| | | | Hexachloroethane | -- | -- | -- | -- | UR | 0.02 | 0.02 | -- | 0.03 |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | HM | 0.009 | 0.0006 | -- | 0.009 |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.01 | 0.04 | -- | 0.05 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | -- | -- | HP | 0.003 | -- | -- | 0.003 |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | -- | -- | OT | 0.1 | -- | -- | 0.1 |
| | | | Aroclor 1260 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | RP | 0.4 | 0.003 | -- | 0.4 |
| | | | Chemical Total | -- | -- | -- | -- | | 5 | 0.5 | -- | 5 |
| | | Exposure Point Total | | | | | -- | | | | | 5 |
| | Exposure Medium Total | | | | | | -- | | | | | 5 |

Table 9-8.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Child) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 6 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.9 |
| Total Endocrine (EN) HI across All Media = | 2 |
| Total Gastrointestinal (GI) HI across All Media = | 0.1 |
| Total Hematological (HM) HI across All Media = | 0.08 |
| Total Hepatic (HP) HI across All Media = | 0.2 |
| Total Immune (IM) HI across All Media = | 0.2 |
| Total Musculoskeletal (MS) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.08 |
| Total Ocular (OC) HI across All Media = | 3 |
| Total Other (OT) HI across All Media = | 0.2 |
| Total Reproductive (RP) HI across All Media = | 2 |
| Total Urinary (UR) HI across All Media = | 0.07 |

Table 9-9.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.08 | 0.004 | -- | 0.09 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.08 | 0.004 | -- | 0.09 |
| | | Exposure Point Total | | | | | -- | | | | | 0.09 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.09 |
| | Outdoor Air | Particulates above Site | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.09 |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.006 | 0.0007 | -- | 0.007 |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.02 | 0.001 | -- | 0.02 |
| | | | 1,1-Dichloroethane | -- | -- | -- | -- | UR | 0.0002 | 0.00001 | -- | 0.0002 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | 0.001 | 0.0001 | -- | 0.001 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | EN | 0.006 | 0.008 | -- | 0.01 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 0.8 | 0.2 | -- | 1 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.009 | 0.0005 | -- | 0.009 |
| | | | 1,2-Dichloropropane | -- | -- | -- | -- | MS | 0.0009 | 0.00008 | -- | 0.001 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | 0.0003 | 0.0002 | -- | 0.0006 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | HP | 0.002 | 0.002 | -- | 0.004 |
| | | | 1,4-Dichlorobenzene | -- | -- | -- | -- | HP | 0.0005 | 0.0004 | -- | 0.0009 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | 0.04 | 0.002 | -- | 0.04 |
| | | | Bromodichloromethane | -- | -- | -- | -- | UR | 0.001 | 0.00009 | -- | 0.001 |
| | | | Bromoform | -- | -- | -- | -- | HP | 0.004 | 0.0003 | -- | 0.004 |
| | | | Bromomethane | -- | -- | -- | -- | GI | 0.04 | 0.001 | -- | 0.04 |
| | | | Carbon Tetrachloride | -- | -- | -- | -- | HM | 0.01 | 0.003 | -- | 0.01 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP | 0.002 | 0.0006 | -- | 0.002 |
| | | | Chloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.0007 | 0.00008 | -- | 0.0008 |
| | | | Dibromochloromethane | -- | -- | -- | -- | HP | 0.002 | 0.0001 | -- | 0.002 |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | 0.0007 | 0.00009 | -- | 0.0008 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.007 | 0.02 | -- | 0.02 |
| | | | Methyl Tertiary Butyl Ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |

Table 9-9.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Adult) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | -- | -- | -- | -- | HP | 0.007 | 0.0002 | -- | 0.007 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | IM | 0.003 | 0.0004 | -- | 0.004 |
| | | | trans-1,3-Dichloropropene | -- | -- | -- | -- | GI | 0.001 | 0.0001 | -- | 0.001 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.01 | 0.001 | -- | 0.02 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | -- | -- | -- | -- | RP | 0.02 | 0.02 | -- | 0.04 |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | OC | 0.03 | 0.001 | -- | 0.03 |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.008 | 0.0005 | -- | 0.009 |
| | | | 2,6-Dinitrotoluene | -- | -- | -- | -- | IM | 0.05 | 0.004 | -- | 0.06 |
| | | | 2-Nitrophenol | -- | -- | -- | -- | OC | 0.3 | 0.003 | -- | 0.3 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 0.8 | 0.06 | -- | 0.9 |
| | | | 4-Chloroaniline | -- | -- | -- | -- | IM | 0.002 | 0.0001 | -- | 0.002 |
| | | | 4-Nitroaniline | -- | -- | -- | -- | IM | 0.007 | 0.0002 | -- | 0.007 |
| | | | 4-Nitrophenol | -- | -- | -- | -- | OC | 0.3 | 0.004 | -- | 0.3 |
| | | | Atrazine | -- | -- | -- | -- | OT | 0.0002 | 0.00002 | -- | 0.0002 |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | HP | 0.003 | -- | -- | 0.003 |
| | | | Butylbenzylphthalate | -- | -- | -- | -- | HP | 0.0003 | 0.0005 | -- | 0.0009 |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.02 | -- | -- | 0.02 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | GI | 0.009 | 0.03 | -- | 0.04 |
| | | | Hexachloroethane | -- | -- | -- | -- | UR | 0.009 | 0.01 | -- | 0.02 |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | HM | 0.005 | 0.0004 | -- | 0.006 |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.006 | 0.02 | -- | 0.03 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | -- | -- | HP | 0.002 | -- | -- | 0.002 |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | -- | -- | OT | 0.09 | -- | -- | 0.09 |
| | | | Aroclor 1260 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | RP | 0.2 | 0.002 | -- | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | 3 | 0.3 | -- | 3 |
| | | Exposure Point Total | | | | | -- | | | | | 3 |
| | Exposure Medium Total | | | | | | -- | | | | | 3 |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.01 | 0.01 |
| | | | 1,1-Dichloroethane | -- | -- | -- | -- | UR | -- | -- | 0.000003 | 0.000003 |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | HP | -- | -- | 0.00001 | 0.00001 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | UR | -- | -- | 0.0008 | 0.0008 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | -- | -- | 0.01 | 0.01 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | RS | -- | -- | 0.0002 | 0.0002 |
| | | | 1,2-Dichloropropane | -- | -- | -- | -- | RS | -- | -- | 0.0003 | 0.0003 |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.000005 | 0.000005 |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | OT | -- | -- | 0.000007 | 0.000007 |
| | | | 1,4-Dichlorobenzene | -- | -- | -- | -- | HP | -- | -- | 0.000001 | 0.000001 |
| | | | 2-Hexanone | -- | -- | -- | -- | NV | -- | -- | 0.00009 | 0.00009 |
| | | | Bromodichloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromoform | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | NV; RS | -- | -- | 0.0004 | 0.0004 |
| | | | Carbon Tetrachloride | -- | -- | -- | -- | HP | -- | -- | 0.00001 | 0.00001 |
| | | | Chlorobenzene | -- | -- | -- | -- | HP; UR | -- | -- | 0.00002 | 0.00002 |
| | | | Chloromethane | -- | -- | -- | -- | NV | -- | -- | 0.00003 | 0.00003 |
| | | | cis-1,3-Dichloropropene | -- | -- | -- | -- | RS | -- | -- | 0.00004 | 0.00004 |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | OT | -- | -- | 0.00006 | 0.00006 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | -- | -- | HP; UR | -- | -- | 0.0000005 | 0.0000005 |
| | | | Methylene Chloride | -- | -- | -- | -- | HP | -- | -- | 0.000003 | 0.000003 |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | HP; RS | -- | -- | 0.00006 | 0.00006 |
| | | | trans-1,3-Dichloropropene | -- | -- | -- | -- | RS | -- | -- | 0.00005 | 0.00005 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | -- | -- | 0.00002 | 0.00002 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.007 | 0.007 |
| | | | Hexachloroethane | -- | -- | -- | -- | NV | -- | -- | 0.000006 | 0.000006 |
| | | | Nitrobenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000005 | 0.000005 |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | -- | -- | -- | -- | -- | -- | -- |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Aroclor 1232 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | 0.005 | 0.005 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.03 | 0.03 |
| | | Exposure Point Total | | | | | -- | | | | | 0.03 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.03 |
| Medium Total | | | | | | | -- | | | | | 3 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.09 |
| Total Endocrine (EN) HI across All Media = | 0.9 |
| Total Gastrointestinal (GI) HI across All Media = | 0.08 |
| Total Hematological (HM) HI across All Media = | 0.05 |
| Total Hepatic (HP) HI across All Media = | 0.1 |
| Total Immune (IM) HI across All Media = | 0.09 |
| Total Musculoskeletal (MS) HI across All Media = | 0.001 |
| Total Nervous (NV) HI across All Media = | 0.05 |
| Total Ocular (OC) HI across All Media = | 2 |
| Total Other (OT) HI across All Media = | 0.09 |
| Total Reproductive (RP) HI across All Media = | 1 |
| Total Respiratory (RS) HI across All Media = | 0.02 |
| Total Urinary (UR) HI across All Media = | 0.04 |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | -- |
| Groundwater | Groundwater | Groundwater | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 1E-05 | 1E-06 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethane | 8E-08 | 6E-09 | -- | 9E-08 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,2,4-Trichlorobenzene | 8E-07 | 1E-06 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | 2E-04 | 3E-05 | -- | 2E-04 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | 7E-05 | 4E-06 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichloropropane | 6E-08 | 5E-09 | -- | 6E-08 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,4-Dichlorobenzene | 8E-08 | 6E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromodichloromethane | 7E-07 | 5E-08 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Bromoform | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Carbon Tetrachloride | 1E-06 | 3E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Chlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chloromethane | 3E-07 | 8E-09 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | 1E-06 | 1E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Dibromochloromethane | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | 2E-07 | 5E-07 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | 4E-08 | 8E-10 | -- | 4E-08 | -- | -- | -- | -- | -- |

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|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Methylene Chloride | 1E-07 | 4E-09 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | trans-1,3-Dichloropropene | 1E-06 | 1E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | 7E-05 | 5E-06 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4,6-Trichlorophenol | 1E-07 | 7E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | 2,4-Dinitrophenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 2,4-Dinitrotoluene | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 2,6-Dinitrotoluene | 1E-05 | 7E-07 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | 2-Nitrophenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 3,3-Dichlorobenzidine | 6E-06 | 2E-06 | -- | 9E-06 | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4-Chloroaniline | 6E-07 | 4E-08 | -- | 6E-07 | -- | -- | -- | -- | -- |
| | | | 4-Nitroaniline | 2E-07 | 7E-09 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | 4-Nitrophenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Atrazine | 6E-07 | 8E-08 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | 5E-06 | 1E-07 | -- | 5E-06 | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | 4E-07 | -- | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Butylbenzylphthalate | 5E-08 | 8E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 1E-05 | -- | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 9E-06 | -- | -- | 9E-06 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachloroethane | 1E-07 | 1E-07 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 4E-05 | 1E-06 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | 5E-06 | 2E-05 | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | 4E-07 | -- | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | 7E-06 | 2E-05 | -- | 3E-05 | -- | -- | -- | -- | -- |
| | | | Aroclor 1232 | 6E-06 | 2E-05 | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | 2E-06 | -- | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 4E-04 | 1E-04 | -- | 6E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 6E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 6E-04 | | | | | -- |

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| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 1E-08 | 1E-08 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethane | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | 1,1-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 9E-04 | 9E-04 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | -- | -- | 3E-07 | 3E-07 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichloropropane | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,3-Dichlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,4-Dichlorobenzene | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | 2-Hexanone | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bromodichloromethane | -- | -- | 8E-09 | 8E-09 | -- | -- | -- | -- | -- |
| | | | Bromoform | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Bromomethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Carbon Tetrachloride | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Chlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chloromethane | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | cis-1,3-Dichloropropene | -- | -- | 9E-10 | 9E-10 | -- | -- | -- | -- | -- |
| | | | Dibromochloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dichlorodifluoromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Methyl Tertiary Butyl Ether | -- | -- | 1E-10 | 1E-10 | -- | -- | -- | -- | -- |
| | | | Methylene Chloride | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | trans-1,2-Dichloroethene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | trans-1,3-Dichloropropene | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | -- | -- | 9E-07 | 9E-07 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | Bis(2-chloroethyl)ether | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachloroethane | -- | -- | 6E-10 | 6E-10 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | 5E-10 | 5E-10 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | Aldrin | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Polychlorinated Biphenyls (PCBs) | | | | | | | | | |
| | | | Aroclor 1221 | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |

Table 9-10.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Hypothetical Resident (Lifetime) - Total Soil, Soil (Outdoor Air), Groundwater (Trench) or (Outdoor Air), Groundwater (Potable Use), Groundwater (Vapor Intrusion)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Hypothetical Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Aroclor 1232 | -- | -- | 3E-08 | 3E-08 | -- | -- | -- | -- | -- |
| | | | Aroclor 1242 | -- | -- | 7E-09 | 7E-09 | -- | -- | -- | -- | -- |
| | | | Aroclor 1248 | -- | -- | 7E-09 | 7E-09 | -- | -- | -- | -- | -- |
| | | | Aroclor 1254 | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Aroclor 1260 | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 9E-04 | 9E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 9E-04 | | | | | -- |
| | Exposure Medium Total | | | | | | 9E-04 | | | | | -- |
| Medium Total | | | | | | | 1E-03 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 1E-03 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-11.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.07 | 0.003 | -- | 0.07 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.07 | 0.003 | -- | 0.07 |
| | | Exposure Point Total | | | | | -- | | | | | 0.07 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.07 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.07 |
| | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.07 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.07 |

Table 9-12.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) Carcinogenic Risk [1] | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) Non-Carcinogenic Hazard Quotient [1] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.01 | 0.005 | -- | 0.02 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.01 | 0.005 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.02 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.02 |

Table 9-13.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.6 | 0.02 | -- | 0.7 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.6 | 0.02 | -- | 0.7 |
| | | Exposure Point Total | | | | | -- | | | | | 0.7 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.7 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.7 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.7 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.7 |

Table 9-14.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.06 | 0.0003 | -- | 0.06 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.06 | 0.0003 | -- | 0.06 |
| | | Exposure Point Total | | | | | -- | | | | | 0.06 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.06 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.06 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.06 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.06 |

Table 9-15.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Central/Southern)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-16.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Maintenance Worker - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Maintenance Worker |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.05 | 0.002 | -- | 0.06 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.002 | -- | 0.06 |
| | | Exposure Point Total | | | | | -- | | | | | 0.06 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.06 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.06 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.06 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.06 |

Table 9-17.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Trespasser (Teen) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.01 | 0.004 | -- | 0.01 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.01 | 0.004 | -- | 0.01 |
| | | Exposure Point Total | | | | | -- | | | | | 0.01 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.01 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.01 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.01 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.01 |

Table 9-18.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Recreator (Child) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.5 | 0.01 | -- | 0.5 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.5 | 0.01 | -- | 0.5 |
| | | Exposure Point Total | | | | | -- | | | | | 0.5 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.5 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.5 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.5 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.5 |

Table 9-19.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Recreator (Adult) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.05 | 0.0002 | -- | 0.05 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.05 | 0.0002 | -- | 0.05 |
| | | Exposure Point Total | | | | | -- | | | | | 0.05 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.05 |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | 0.05 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 0.05 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.05 |

Table 9-20.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Northern/Western)
Future On-Site Outdoor Recreator (Lifetime) - Total Soil, Soil (Outdoor Air)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Soil | Total Soil | Total Soil | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| | Outdoor Air | Particulates above Site | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-21.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.02 | 0.0003 | -- | 0.02 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.02 | 0.0003 | -- | 0.02 |
| | | Exposure Point Total | | | | | -- | | | | | 0.02 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.02 |
| Medium Total | | | | | | | -- | | | | | 0.02 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 1E-09 | 2E-09 | -- | 3E-09 | HP | 0.000002 | 0.000004 | -- | 0.000005 |
| | | | 1,2,4-Trichlorobenzene | 8E-11 | 2E-09 | -- | 2E-09 | EN | 0.000002 | 0.00004 | -- | 0.00004 |
| | | | 1,2-Dibromo-3-chloropropane | 3E-08 | 5E-08 | -- | 9E-08 | RP | 0.0003 | 0.0008 | -- | 0.001 |
| | | | 1,2-Dibromoethane | 7E-09 | 6E-09 | -- | 1E-08 | EN; HP; RP | 0.000003 | 0.000002 | -- | 0.000005 |
| | | | Hexachlorobutadiene | 1E-10 | 4E-09 | -- | 4E-09 | UR | 0.00001 | 0.0004 | -- | 0.0004 |
| | | | Vinyl Chloride | 8E-09 | 6E-09 | -- | 1E-08 | HP | 0.000004 | 0.000007 | -- | 0.00001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4-Dinitrotoluene | 2E-09 | 2E-09 | -- | 4E-09 | HM; HP; NV | 0.00002 | 0.00002 | -- | 0.00005 |
| | | | 3,3-Dichlorobenzidine | 4E-09 | 3E-08 | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 2E-09 | -- | -- | 2E-09 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 3E-08 | -- | -- | 3E-08 | DV | 0.0001 | -- | -- | 0.0001 |
| | | | Benzo(b)fluoranthene | 3E-09 | -- | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | Benzo(k)fluoranthene | 3E-10 | -- | -- | 3E-10 | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | 5E-09 | 2E-09 | -- | 8E-09 | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | 9E-11 | -- | -- | 9E-11 | HP | 0.000002 | -- | -- | 0.000002 |
| | | | Butylbenzylphthalate | 9E-12 | 2E-10 | -- | 2E-10 | HP | 0.0000002 | 0.000004 | -- | 0.000004 |
| | | | Chrysene | 2E-11 | -- | -- | 2E-11 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 3E-08 | -- | -- | 3E-08 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 7E-09 | -- | -- | 7E-09 | HP | 0.00004 | -- | -- | 0.00004 |
| | | | Hexachloroethane | 9E-11 | 2E-09 | -- | 2E-09 | UR | 0.00002 | 0.0004 | -- | 0.0004 |
| | | | Indeno(1,2,3-cd)pyrene | 3E-09 | -- | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 3E-08 | 1E-08 | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | 6E-09 | 4E-07 | -- | 4E-07 | HP | 0.00002 | 0.001 | -- | 0.001 |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 4E-12 | 7E-10 | -- | 7E-10 | HP | 0.000004 | 0.0006 | -- | 0.0007 |
| | | | 4,4'-DDE | 4E-12 | -- | -- | 4E-12 | HP | 0.0000003 | -- | -- | 0.0000003 |
| | | | 4,4'-DDT | 1E-11 | -- | -- | 1E-11 | HP | 0.0000005 | -- | -- | 0.0000005 |
| | | | Aldrin | 4E-10 | -- | -- | 4E-10 | HP | 0.000006 | -- | -- | 0.000006 |
| | | | alpha-BHC | 1E-10 | 1E-09 | -- | 2E-09 | HP | 0.00000002 | 0.0000002 | -- | 0.0000002 |
| | | | Dieldrin | 2E-10 | 6E-09 | -- | 6E-09 | HP | 0.000002 | 0.00005 | -- | 0.00006 |

Table 9-21.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Trespasser (Teen) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Trespasser |
| Receptor Age: | Teen |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Heptachlor | 9E-11 | 1E-08 | -- | 1E-08 | HP | 0.0000003 | 0.00003 | -- | 0.00003 |
| | | | Heptachlor epoxide | 1E-10 | 2E-09 | -- | 2E-09 | HP | 0.000006 | 0.0001 | -- | 0.0001 |
| | | | Toxaphene | 8E-10 | -- | -- | 8E-10 | HP | 0.00006 | -- | -- | 0.00006 |
| | | | Cyanide | -- | -- | -- | -- | RP | 0.8 | 0.1 | -- | 0.9 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.01 | 0.002 | -- | 0.01 |
| | | | Chemical Total | 2E-07 | 5E-07 | -- | 7E-07 | | 0.8 | 0.1 | -- | 0.9 |
| | | Exposure Point Total | | | | | 7E-07 | | | | | 0.9 |
| | Exposure Medium Total | | | | | | 7E-07 | | | | | 0.9 |
| Medium Total | | | | | | | 7E-07 | | | | | 0.9 |
| Notes: | | | | | | Receptor Risk Total | 7E-07 | | | | Receptor Hazard Index (HI) | 0.9 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.03 |
| Total Developmental (DV) HI across All Media = | 0.0001 |
| Total Endocrine (EN) HI across All Media = | 0.00005 |
| Total Hematological (HM) HI across All Media = | 0.00005 |
| Total Hepatic (HP) HI across All Media = | 0.002 |
| Total Nervous (NV) HI across All Media = | 0.00005 |
| Total Reproductive (RP) HI across All Media = | 0.9 |
| Total Urinary (UR) HI across All Media = | 0.0008 |

Table 9-22.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.8 | 0.02 | -- | 0.8 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.8 | 0.02 | -- | 0.8 |
| | | Exposure Point Total | | | | | -- | | | | | 0.8 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.8 |
| Medium Total | | | | | | | -- | | | | | 0.8 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.00004 | 0.00002 | -- | 0.00007 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | EN | 0.00004 | 0.0003 | -- | 0.0003 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 0.006 | 0.005 | -- | 0.01 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.00006 | 0.00001 | -- | 0.00008 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.0002 | 0.002 | -- | 0.002 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.0001 | 0.00004 | -- | 0.0001 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.0005 | 0.0001 | -- | 0.0007 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.003 | -- | -- | 0.003 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(k)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | HP | 0.00005 | -- | -- | 0.00005 |
| | | | Butylbenzylphthalate | -- | -- | -- | -- | HP | 0.000004 | 0.00002 | -- | 0.00003 |
| | | | Chrysene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.0008 | -- | -- | 0.0008 |
| | | | Hexachloroethane | -- | -- | -- | -- | UR | 0.0005 | 0.002 | -- | 0.003 |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.0005 | 0.008 | -- | 0.008 |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.0001 | 0.004 | -- | 0.004 |
| | | | 4,4'-DDE | -- | -- | -- | -- | HP | 0.000007 | -- | -- | 0.000007 |
| | | | 4,4'-DDT | -- | -- | -- | -- | HP | 0.00001 | -- | -- | 0.00001 |
| | | | Aldrin | -- | -- | -- | -- | HP | 0.0001 | -- | -- | 0.0001 |
| | | | alpha-BHC | -- | -- | -- | -- | HP | 0.0000004 | 0.000001 | -- | 0.000002 |
| | | | Dieldrin | -- | -- | -- | -- | HP | 0.00004 | 0.0003 | -- | 0.0004 |

Table 9-22.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Child) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Heptachlor | -- | -- | -- | -- | HP | 0.000006 | 0.0002 | -- | 0.0002 |
| | | | Heptachlor epoxide | -- | -- | -- | -- | HP | 0.0001 | 0.0007 | -- | 0.0009 |
| | | | Toxaphene | -- | -- | -- | -- | HP | 0.001 | -- | -- | 0.001 |
| | | | Cyanide | -- | -- | -- | -- | RP | 18 | 0.8 | -- | 19 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.3 | 0.01 | -- | 0.3 |
| | | | Chemical Total | -- | -- | -- | -- | | 18 | 0.9 | -- | 19 |
| | | Exposure Point Total | | | | | -- | | | | | 19 |
| | Exposure Medium Total | | | | | | -- | | | | | 19 |
| Medium Total | | | | | | | -- | | | | | 19 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 20 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 1 |
| Total Developmental (DV) HI across All Media = | 0.003 |
| Total Endocrine (EN) HI across All Media = | 0.0004 |
| Total Hematological (HM) HI across All Media = | 0.0007 |
| Total Hepatic (HP) HI across All Media = | 0.02 |
| Total Nervous (NV) HI across All Media = | 0.0007 |
| Total Reproductive (RP) HI across All Media = | 19 |
| Total Urinary (UR) HI across All Media = | 0.005 |

Table 9-23.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.08 | 0.004 | -- | 0.08 |
| | | | Chemical Total | -- | -- | -- | -- | | 0.08 | 0.004 | -- | 0.08 |
| | | Exposure Point Total | | | | | -- | | | | | 0.08 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.08 |
| Medium Total | | | | | | | -- | | | | | 0.08 |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.000007 | 0.00001 | -- | 0.00002 |
| | | | 1,2,4-Trichlorobenzene | -- | -- | -- | -- | EN | 0.000007 | 0.0001 | -- | 0.0002 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 0.0009 | 0.003 | -- | 0.004 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.00001 | 0.000008 | -- | 0.00002 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.00003 | 0.001 | -- | 0.001 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.00002 | 0.00002 | -- | 0.00004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.00008 | 0.00008 | -- | 0.0002 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.0005 | -- | -- | 0.0005 |
| | | | Benzo(b)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(k)fluoranthene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | HP | 0.000008 | -- | -- | 0.000008 |
| | | | Butylbenzylphthalate | -- | -- | -- | -- | HP | 0.0000006 | 0.00001 | -- | 0.00001 |
| | | | Chrysene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.0001 | -- | -- | 0.0001 |
| | | | Hexachloroethane | -- | -- | -- | -- | UR | 0.00008 | 0.001 | -- | 0.001 |
| | | | Indeno(1,2,3-cd)pyrene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.00007 | 0.004 | -- | 0.004 |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | -- | -- | -- | -- | HP | 0.00002 | 0.002 | -- | 0.002 |
| | | | 4,4'-DDE | -- | -- | -- | -- | HP | 0.000001 | -- | -- | 0.000001 |
| | | | 4,4'-DDT | -- | -- | -- | -- | HP | 0.000002 | -- | -- | 0.000002 |
| | | | Aldrin | -- | -- | -- | -- | HP | 0.00002 | -- | -- | 0.00002 |
| | | | alpha-BHC | -- | -- | -- | -- | HP | 0.00000006 | 0.0000007 | -- | 0.0000008 |
| | | | Dieldrin | -- | -- | -- | -- | HP | 0.000007 | 0.0002 | -- | 0.0002 |

Table 9-23.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Adult) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Heptachlor | -- | -- | -- | -- | HP | 0.000001 | 0.0001 | -- | 0.0001 |
| | | | Heptachlor epoxide | -- | -- | -- | -- | HP | 0.00002 | 0.0004 | -- | 0.0004 |
| | | | Toxaphene | -- | -- | -- | -- | HP | 0.0002 | -- | -- | 0.0002 |
| | | | Cyanide | -- | -- | -- | -- | RP | 3 | 0.5 | -- | 3 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | DM | 0.04 | 0.006 | -- | 0.05 |
| | | | Chemical Total | -- | -- | -- | -- | | 3 | 0.5 | -- | 3 |
| | | Exposure Point Total | | | | | -- | | | | | 3 |
| | Exposure Medium Total | | | | | | -- | | | | | 3 |
| Medium Total | | | | | | | -- | | | | | 3 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 3 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Dermal (DM) HI across All Media = | 0.1 |
| Total Developmental (DV) HI across All Media = | 0.0005 |
| Total Endocrine (EN) HI across All Media = | 0.0002 |
| Total Hematological (HM) HI across All Media = | 0.0002 |
| Total Hepatic (HP) HI across All Media = | 0.008 |
| Total Nervous (NV) HI across All Media = | 0.0002 |
| Total Reproductive (RP) HI across All Media = | 3 |
| Total Urinary (UR) HI across All Media = | 0.003 |

Table 9-24.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Sediment | Sediment | Sediment | | | | | | | | | | |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | -- | | | | | -- |
| | Exposure Medium Total | | | | | | -- | | | | | -- |
| Medium Total | | | | | | | -- | | | | | -- |
| Surface Water | Surface Water | Surface Water | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 2E-08 | 2E-08 | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | 1,2,4-Trichlorobenzene | 2E-09 | 2E-08 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | 4E-07 | 5E-07 | -- | 8E-07 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | 1E-07 | 7E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | 2E-09 | 4E-08 | -- | 5E-08 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | 9E-07 | 4E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 2,4-Dinitrotoluene | 4E-08 | 2E-08 | -- | 6E-08 | -- | -- | -- | -- | -- |
| | | | 3,3-Dichlorobenzidine | 9E-08 | 3E-07 | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 2E-08 | -- | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 4E-07 | -- | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(b)fluoranthene | 4E-08 | -- | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | Benzo(k)fluoranthene | 3E-09 | -- | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | 1E-07 | 3E-08 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | bis(2-Ethylhexyl)phthalate | 2E-09 | -- | -- | 2E-09 | -- | -- | -- | -- | -- |
| | | | Butylbenzylphthalate | 2E-10 | 2E-09 | -- | 3E-09 | -- | -- | -- | -- | -- |
| | | | Chrysene | 2E-10 | -- | -- | 2E-10 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 3E-07 | -- | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 1E-07 | -- | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Hexachloroethane | 2E-09 | 2E-08 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Indeno(1,2,3-cd)pyrene | 4E-08 | -- | -- | 4E-08 | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 5E-07 | 1E-07 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | 1E-07 | 4E-06 | -- | 4E-06 | -- | -- | -- | -- | -- |
| | | | Pesticides | | | | | | | | | |
| | | | 4,4'-DDD | 9E-11 | 7E-09 | -- | 7E-09 | -- | -- | -- | -- | -- |
| | | | 4,4'-DDE | 9E-11 | -- | -- | 9E-11 | -- | -- | -- | -- | -- |
| | | | 4,4'-DDT | 3E-10 | -- | -- | 3E-10 | -- | -- | -- | -- | -- |
| | | | Aldrin | 9E-09 | -- | -- | 9E-09 | -- | -- | -- | -- | -- |
| | | | alpha-BHC | 3E-09 | 2E-08 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Dieldrin | 4E-09 | 7E-08 | -- | 7E-08 | -- | -- | -- | -- | -- |

Table 9-24.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Downgradient Estuarine)
Current/Future On-Site Outdoor Recreator (Lifetime) - Sediment, Surface Water
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | On-Site Outdoor Recreator |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | Heptachlor | 2E-09 | 1E-07 | -- | 1E-07 | -- | -- | -- | -- | -- |
| | | | Heptachlor epoxide | 2E-09 | 2E-08 | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Toxaphene | 2E-08 | -- | -- | 2E-08 | -- | -- | -- | -- | -- |
| | | | Cyanide | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 3E-06 | 5E-06 | -- | 9E-06 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 9E-06 | | | | | -- |
| | Exposure Medium Total | | | | | | 9E-06 | | | | | -- |
| Medium Total | | | | | | | 9E-06 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 9E-06 | | | Receptor Hazard Index (HI) | | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

Table 9-25.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Child) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.001 | 0.0001 | -- | 0.001 |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.005 | 0.0003 | -- | 0.005 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 0.1 | 0.02 | -- | 0.1 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.002 | 0.0001 | -- | 0.002 |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.003 | 0.0001 | -- | 0.003 |
| | | | Bromodichloromethane | -- | -- | -- | -- | UR | 0.001 | 0.00006 | -- | 0.001 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.002 | 0.0002 | -- | 0.002 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.01 | 0.02 | -- | 0.03 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.04 | 0.006 | -- | 0.05 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.007 | 0.0004 | -- | 0.007 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00002 | 0.00003 | -- | 0.00005 |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.01 | 0.0007 | -- | 0.01 |
| | | | 2,6-Dinitrotoluene | -- | -- | -- | -- | IM | 0.08 | 0.005 | -- | 0.09 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 1 | 0.08 | -- | 1 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.01 | -- | -- | 0.01 |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.02 | -- | -- | 0.02 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | GI | 0.01 | 0.04 | -- | 0.05 |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | HM | 0.005 | 0.0003 | -- | 0.005 |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.007 | 0.03 | -- | 0.03 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.7 | -- | -- | 0.7 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.9 | 0.03 | -- | 1 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.7 | 0.003 | -- | 0.7 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.1 | 0.01 | -- | 0.1 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.04 | 0.01 | -- | 0.06 |
| | | | Cobalt | -- | -- | -- | -- | EN | 1 | 0.002 | -- | 1 |
| | | | Thallium | -- | -- | -- | -- | DM | 62 | 0.3 | -- | 63 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.1 | 0.02 | -- | 0.1 |
| | | | Chemical Total | -- | -- | -- | -- | | 68 | 0.5 | -- | 68 |
| | | Exposure Point Total | | | | | -- | | | | | 68 |

Table 9-25.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Child) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Exposure Medium Total | | | | | | -- | | | | | 68 |
| | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 68 |

Notes:

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.7 |
| Total Dermal (DM) HI across All Media = | 63 |
| Total Developmental (DV) HI across All Media = | 0.06 |
| Total Endocrine (EN) HI across All Media = | 2 |
| Total Gastrointestinal (GI) HI across All Media = | 0.05 |
| Total Hematological (HM) HI across All Media = | 1 |
| Total Hepatic (HP) HI across All Media = | 0.08 |
| Total Immune (IM) HI across All Media = | 0.1 |
| Total Nervous (NV) HI across All Media = | 0.01 |
| Total Ocular (OC) HI across All Media = | 1 |
| Total Other (OT) HI across All Media = | 1 |
| Total Reproductive (RP) HI across All Media = | 0.8 |
| Total Urinary (UR) HI across All Media = | 0.2 |

Table 9-26.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | HP | 0.0006 | 0.00007 | -- | 0.0007 |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | HM; IM | 0.003 | 0.0002 | -- | 0.003 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | 0.06 | 0.01 | -- | 0.07 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | EN; HP; RP | 0.001 | 0.00007 | -- | 0.001 |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | UR | 0.002 | 0.00009 | -- | 0.002 |
| | | | Bromodichloromethane | -- | -- | -- | -- | UR | 0.0006 | 0.00004 | -- | 0.0006 |
| | | | Chloroform | -- | -- | -- | -- | HP | 0.001 | 0.0001 | -- | 0.001 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | UR | 0.006 | 0.01 | -- | 0.02 |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | 0.02 | 0.004 | -- | 0.03 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | 0.004 | 0.0003 | -- | 0.004 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | UR | 0.00001 | 0.00002 | -- | 0.00003 |
| | | | 2,4-Dinitrotoluene | -- | -- | -- | -- | HM; HP; NV | 0.007 | 0.0004 | -- | 0.008 |
| | | | 2,6-Dinitrotoluene | -- | -- | -- | -- | IM | 0.05 | 0.004 | -- | 0.05 |
| | | | 3,3-Dichlorobenzidine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | EN; OC | 0.7 | 0.05 | -- | 0.8 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | -- | -- | -- | -- | DV | 0.008 | -- | -- | 0.008 |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | HP | 0.01 | -- | -- | 0.01 |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | GI | 0.008 | 0.03 | -- | 0.03 |
| | | | n-Nitrosodi-n-propylamine | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | HM | 0.003 | 0.0002 | -- | 0.003 |
| | | | Pentachlorophenol | -- | -- | -- | -- | HP | 0.004 | 0.02 | -- | 0.02 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | RP | 0.4 | -- | -- | 0.4 |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | HM; OT | 0.6 | 0.02 | -- | 0.6 |
| | | | Arsenic | -- | -- | -- | -- | CV; DM | 0.4 | 0.002 | -- | 0.4 |
| | | | Cadmium (Water) | -- | -- | -- | -- | UR | 0.07 | 0.008 | -- | 0.08 |
| | | | Chromium, Total | -- | -- | -- | -- | NA | 0.02 | 0.01 | -- | 0.04 |
| | | | Cobalt | -- | -- | -- | -- | EN | 0.6 | 0.001 | -- | 0.7 |
| | | | Thallium | -- | -- | -- | -- | DM | 37 | 0.2 | -- | 38 |
| | | | Vanadium | -- | -- | -- | -- | DM | 0.07 | 0.02 | -- | 0.09 |
| | | | Chemical Total | -- | -- | -- | -- | | 41 | 0.4 | -- | 41 |
| | | Exposure Point Total | | | | | -- | | | | | 41 |

Table 9-26.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Exposure Medium Total | | | | | | -- | | | | | 41 |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | -- | -- | RS | -- | -- | 0.002 | 0.002 |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | -- | -- | RP | -- | -- | 0.0007 | 0.0007 |
| | | | 1,2-Dibromoethane | -- | -- | -- | -- | RS | -- | -- | 0.00003 | 0.00003 |
| | | | 1,2-Dichloroethane | -- | -- | -- | -- | NV | -- | -- | 0.00006 | 0.00006 |
| | | | Bromodichloromethane | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chloroform | -- | -- | -- | -- | HP | -- | -- | 0.000004 | 0.000004 |
| | | | Hexachlorobutadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | -- | -- | DV; IM | -- | -- | 0.0002 | 0.0002 |
| | | | Vinyl Chloride | -- | -- | -- | -- | HP | -- | -- | 0.000006 | 0.000006 |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | HP; UR | -- | -- | 0.0003 | 0.0003 |
| | | | Benzo(a)anthracene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | RS | -- | -- | 0.006 | 0.006 |
| | | | Nitrobenzene | -- | -- | -- | -- | NV; RS | -- | -- | 0.000003 | 0.000003 |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | -- | -- | -- | -- | -- | 0.00004 | 0.00004 |
| | | | Chemical Total | -- | -- | -- | -- | | -- | -- | 0.009 | 0.009 |
| | | Exposure Point Total | | | | | -- | | | | | 0.009 |
| | Exposure Medium Total | | | | | | -- | | | | | 0.009 |
| Medium Total | | | | | | | -- | | | | | 41 |
| Notes: | | | | | | Receptor Risk Total | -- | | | | Receptor Hazard Index (HI) | 41 |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

| | |
|---|---|
| Total Cardiovascular (CV) HI across All Media = | 0.4 |
| Total Dermal (DM) HI across All Media = | 38 |
| Total Developmental (DV) HI across All Media = | 0.04 |
| Total Endocrine (EN) HI across All Media = | 1 |
| Total Gastrointestinal (GI) HI across All Media = | 0.03 |
| Total Hematological (HM) HI across All Media = | 0.6 |
| Total Hepatic (HP) HI across All Media = | 0.05 |
| Total Immune (IM) HI across All Media = | 0.08 |
| Total Nervous (NV) HI across All Media = | 0.008 |
| Total Ocular (OC) HI across All Media = | 0.8 |
| Total Other (OT) HI across All Media = | 0.6 |

Table 9-26.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Adult) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | | | | | | | | | Total Reproductive (RP) HI across All Media = | | | 0.5 |
| | | | | | | | | | Total Respiratory (RS) HI across All Media = | | | 0.008 |
| | | | | | | | | | Total Urinary (UR) HI across All Media = | | | 0.1 |

Table 9-27.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| Groundwater | Groundwater | Groundwater | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | 1E-06 | 1E-07 | -- | 1E-06 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | 1E-05 | 2E-06 | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | 1E-05 | 6E-07 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichloroethane | 5E-07 | 2E-08 | -- | 5E-07 | -- | -- | -- | -- | -- |
| | | | Bromodichloromethane | 3E-07 | 2E-08 | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Chloroform | 2E-07 | 1E-08 | -- | 2E-07 | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | 2E-07 | 5E-07 | -- | 7E-07 | -- | -- | -- | -- | -- |
| | | | Trichloroethene | 3E-07 | 5E-08 | -- | 4E-07 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | 2E-05 | 1E-06 | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | 2E-08 | 3E-08 | -- | 5E-08 | -- | -- | -- | -- | -- |
| | | | 2,4-Dinitrotoluene | 2E-06 | 1E-07 | -- | 2E-06 | -- | -- | -- | -- | -- |
| | | | 2,6-Dinitrotoluene | 1E-05 | 7E-07 | -- | 1E-05 | -- | -- | -- | -- | -- |
| | | | 3,3-Dichlorobenzidine | 6E-06 | 2E-06 | -- | 8E-06 | -- | -- | -- | -- | -- |
| | | | 4,6-Dinitro-2-methylphenol | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | 3E-07 | -- | -- | 3E-07 | -- | -- | -- | -- | -- |
| | | | Benzo(a)pyrene | 3E-06 | -- | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | 3E-06 | 7E-08 | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Dibenz(a,h)anthracene | 3E-06 | -- | -- | 3E-06 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | 8E-06 | -- | -- | 8E-06 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | n-Nitrosodi-n-propylamine | 4E-05 | 1E-06 | -- | 4E-05 | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Pentachlorophenol | 4E-06 | 1E-05 | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | 2E-05 | -- | -- | 2E-05 | -- | -- | -- | -- | -- |
| | | | Metals (Total) | | | | | | | | | |
| | | | Antimony | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Arsenic | 8E-05 | 4E-07 | -- | 8E-05 | -- | -- | -- | -- | -- |
| | | | Cadmium (Water) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chromium, Total | 5E-05 | 2E-05 | -- | 7E-05 | -- | -- | -- | -- | -- |
| | | | Cobalt | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Thallium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Vanadium | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Chemical Total | 3E-04 | 5E-05 | -- | 3E-04 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 3E-04 | | | | | -- |

Table 9-27.DSA
Summary of Chemical Cancer Risks and Non-Cancer Hazards for COPCs
Reasonable Maximum Exposure (Data Sensitivity Analysis; Site-Wide (Yorktown Aquifer))
Current/Future Off-Site Resident (Lifetime) - Groundwater (Potable Use)
Remedial Investigation Report
Project 15 CL, Wallops Flight Facility, Wallops Island, VA

| | |
|---|---|
| Scenario Timeframe: | Current/Future |
| Receptor Population: | Off-Site Resident |
| Receptor Age: | Lifetime |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Thresholds: Chemical-specific (1E-06) and Cumulative (1E-04) | | | | Thresholds: Chemical-specific, Target Organ and Cumulative (HQ > 1) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Carcinogenic Risk [1] | | | | Non-Carcinogenic Hazard Quotient [1] | | | | |
| | | | | Ingestion | Dermal | Inhalation | Exposure Routes Total | Primary Target Organs | Ingestion | Dermal | Inhalation | Exposure Routes Total |
| | Exposure Medium Total | | | | | | 3E-04 | | | | | -- |
| | Indoor Air | Shower/Bath (Vapors) | | | | | | | | | | |
| | | | Volatile Organic Compounds (VOCs) | | | | | | | | | |
| | | | 1,1,2,2-Tetrachloroethane | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | 1,1,2-Trichloroethane | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromo-3-chloropropane | -- | -- | 6E-05 | 6E-05 | -- | -- | -- | -- | -- |
| | | | 1,2-Dibromoethane | -- | -- | 5E-08 | 5E-08 | -- | -- | -- | -- | -- |
| | | | 1,2-Dichloroethane | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Bromodichloromethane | -- | -- | 4E-09 | 4E-09 | -- | -- | -- | -- | -- |
| | | | Chloroform | -- | -- | 3E-09 | 3E-09 | -- | -- | -- | -- | -- |
| | | | Hexachlorobutadiene | -- | -- | 1E-09 | 1E-09 | -- | -- | -- | -- | -- |
| | | | Trichloroethene | -- | -- | 7E-08 | 7E-08 | -- | -- | -- | -- | -- |
| | | | Vinyl Chloride | -- | -- | 3E-07 | 3E-07 | -- | -- | -- | -- | -- |
| | | | Semi-volatile Organic Compounds (SVOCs) | | | | | | | | | |
| | | | 1,1'-Biphenyl | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Benzo(a)anthracene | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Bis(2-chloroethyl)ether | -- | -- | 2E-09 | 2E-09 | -- | -- | -- | -- | -- |
| | | | Hexachlorobenzene | -- | -- | 4E-08 | 4E-08 | -- | -- | -- | -- | -- |
| | | | Hexachlorocyclopentadiene | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | Nitrobenzene | -- | -- | 3E-10 | 3E-10 | -- | -- | -- | -- | -- |
| | | | Dioxins/Furans | | | | | | | | | |
| | | | 2,3,7,8-TCDD TEQ | -- | -- | 2E-08 | 2E-08 | -- | -- | -- | -- | -- |
| | | | Chemical Total | -- | -- | 6E-05 | 6E-05 | | -- | -- | -- | -- |
| | | Exposure Point Total | | | | | 6E-05 | | | | | -- |
| | Exposure Medium Total | | | | | | 6E-05 | | | | | -- |
| Medium Total | | | | | | | 4E-04 | | | | | -- |
| Notes: | | | | | | Receptor Risk Total | 4E-04 | | | | Receptor Hazard Index (HI) | -- |

(1) CR and HQs are rounded to one non-zero digit; cumulative totals may be slightly higher or lower depending on degree of rounding.

# Appendix G

## Ecological Risk Assessment Addendum

National Aeronautics and Space Administration

FINAL

# ECOLOGICAL RISK ASSESSMENT
# REVISION 3

# OPERABLE UNIT 7
# FORMERLY USED DEFENSE SITE

# PROJECT 15 CONSTRUCTION DEBRIS LANDFILL

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia

**June 2022**

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Final

# Ecological Risk Assessment
# Revision 3

# Operable Unit 7
# Formerly Used Defense Site
# Project 15 Construction Debris Landfill

**National Aeronautics and Space Administration**
**Goddard Space Flight Facility**
**Wallops Flight Facility**
**Wallops Island, Virginia**

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# Acronyms and Abbreviations

| | |
|---|---|
| % | Percent |
| amsl | above mean sea level |
| AOC | Area of Concern |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| AUF | Area Use Factor |
| BAZ | Biologically Active Zone |
| BERA | Baseline Ecological Risk Assessment |
| bgs | Below Ground Surface |
| BTAG | Biological Technical Assistance Group |
| CDM Smith | CDM Federal Programs Corporation |
| CDL | Construction Debris Landfill |
| COI | Constituent of Interest |
| COPEC | Constituent of Potential Ecological Concern |
| DRM | Dose Rate Model |
| DOE | Department of Energy |
| dw | Dry Weight |
| ECSM | Ecological Conceptual Site Model |
| EDD | Estimated Daily Dose |
| EPC | Exposure Point Concentration |
| ERAGS | Ecological Risk Assessment Guidance for Superfund |
| ESV | Ecological Screening Value |
| ft | Foot or Feet |
| FUDS | Formerly Used Defense Site |
| HMW | high molecular weight |
| HQ | Hazard Quotient |
| HZ | hyporheic zone |
| ITRC | Interstate Technology and Regulatory Council |
| LANL | Los Alamos National Laboratory |
| LOAEL | Lowest Observed Adverse Effect Level |
| LOEC | Lowest Observed Effect Concentration |
| mg/kg, bw-day | Milligrams per kilogram of body weight per day |
| NASA | National Aeronautics and Space Administration |
| NOAEL | No Observed Adverse Effect Level |
| NOEC | No Observed Effect Concentration |
| NWI | National Wetland Inventory |
| OU7 | Operable Unit 7 |
| PAH | polycyclic aromatic hydrocarbon |
| PCE | tetrachloroethene |

# Acronyms and Abbreviations (continued)

| | |
|---|---|
| NRCS | Natural Resources Conservation Service |
| RI | Remedial Investigation |
| RSV | Refined Screening Value |
| SI | Site Inspection |
| SLERA | Screening Level Ecological Risk Assessment |
| SMDP | Scientific Management Decision Point |
| SSL | Soil Screening Level |
| SVOC | semi-volatile organic compound |
| TCE | trichloroethane |
| TEQ | toxicity equivalency quotient |
| T&E | Threatened and Endangered |
| TRV | Toxicity Reference Value |
| UCL | Upper Confidence Limit |
| U.S. | United States |
| USEPA | United States Environmental Protection Agency |
| USFS | United States Forestry Service |
| USFWS | United States Fish and Wildlife Service |
| VA | Virginia |
| VDCR | Virginia Natural Heritage Data Explorer |
| VDEQ | Virginia Department of Environmental Quality |
| Versar | Versar, Inc. |
| VOC | Volatile Organic Compound |
| WFF | Wallops Flight Facility |

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# 0. Executive Summary

An Ecological Risk Assessment (ERA) was conducted for the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's Wallops Flight Facility (WFF; Contract No. 80KSC019D0010) Main Base located near Chincoteague, Virginia. (**Figure 1-1**).

The primary purpose of the ERA is to identify constituents of potential ecological concern (COPECs) and assess the need and the level of effort necessary to perform further evaluation of the current and future Site risk. The ERA fulfills this purpose by: (1) identifying potential ecological receptors and habitats at the Site; (2) determining which pathways are potentially complete; (3) evaluating if constituents of interest (COIs) present within complete exposure pathways have the potential to pose significant environmental risk; and (4) to determine if this potential for risk warrants additional ecological risk characterization.

The ERA was conducted in accordance with the following federal guidance:

- United States Environmental Protection Agency (USEPA). 1997. *Ecological Risk Assessment Guidance for Superfund* (ERAGS).
- USEPA. 2001. *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments.*
- USEPA. 2015a. *EPA Region 3 BTAG – Frequently Asked Questions.* September.
- USEPA. 2018. *Region 4 Ecological Risk Assessment Supplemental Guidance*.

Potential ecological exposure was evaluated under current conditions using recent analytical data collected in relevant exposure media (i.e., surface soil, sediment, surface water, and pore water). Exposures were evaluated for four source areas of concern (AOCs) and several nearby wetland areas potentially impacted by overland flow and groundwater to surface discharge.

The scope of this ERA report includes Steps 1 and 2 of the 8-step ERAGS process (also referred to as a Screening Level Ecological Risk Assessment [SLERA]). Steps 1 and 2 were used to identify COPECs in potentially affected environmental media to support a scientific management decision point (SMDP) regarding the need for further risk characterization and/or remediation. The list of COPECs was refined consistent with the initial stage of a Baseline Ecological Risk Assessment (BERA) Step 3 (referred to as Step 3a COPEC Refinement) to reduce uncertainty in the SLERA Step 1 and 2 conclusions and to refine the recommendations presented in the report by applying more realistic exposure assumptions.

Guided by an ecological conceptual site model (ECSM), a conservative screening evaluation was conducted to assess potential risks related in surface soil (soil macroinvertebrates and terrestrial wildlife) and sediment/surface water/pore water (benthic macroinvertebrates and aquatic/semi-aquatic wildlife). If COIs were detected above wildlife-specific benchmarks, dose rate models (DRMs) were prepared to assess potential adverse effects to selected ecological receptors from incidental and dietary ingestion.

After Step 2 of the SLERA, the results of the risk characterization determined the following SMDPs:

- The information is not adequate to a make a decision at this point and the ecological risk assessment continued to Step 3.
    - All Soil AOCs
        - Surface Soil – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for soil macroinvertebrates and wildlife.
    - Upgradient Drainage
        - Sediment – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for benthic macroinvertebrates and wildlife.
    - Downgradient Estuarine
        - Sediment/Surface Water/Pore Water – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for benthic macroinvertebrates and wildlife.
    - **Table ES-1** includes a summary of COPECs retained for the Step 3a COPEC Refinement within the BERA.

During BERA Step 3a, refinements were made to reduce uncertainty in both the direct contact evaluation and wildlife DRMs. The results for the refined direct contact evaluation (**Table ES-2 and ES-3)** and wildlife DRMs (**Table ES-4**) are summarized below. The results of the SLERA, BERA Step 3a COPEC refinement, and consideration of the uncertainties present in the evaluation support the following SMDPs for WFF:

- “There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk” (USEPA, 1997)
    - Northern AOC: soil macroinvertebrates and terrestrial wildlife
    - Western AOC: soil macroinvertebrates and terrestrial wildlife
    - Upgradient Drainage: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
- The information indicates a potential for adverse ecological effects
    - Central AOC: soil macroinvertebrates and terrestrial wildlife
    - Southern AOC: soil macroinvertebrates and terrestrial wildlife
    - Downgradient Estuarine: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
        - Impacts to sediment greatest within exposure area – adverse population-level effects to ecological receptors via surface water and pore water are unlikely.

# 1. Introduction

An Ecological Risk Assessment (ERA) was conducted for the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center's Wallops Flight Facility (WFF; Contract No. 80KSC019D0010) Operable Unit 7 (OU7), Project 15 Construction Debris Landfill (CDL) located near Chincoteague, Virginia. (**Figure 1-1**).

The primary purpose of the ERA is to identify constituents of potential ecological concern (COPECs) and assess the need and the level of effort necessary to perform further evaluation of the current and future Site risk. The ERA fulfills this purpose by: (1) identifying potential ecological receptors and habitats at the Site; (2) determining which pathways are potentially complete; (3) evaluating if constituents of interest (COIs) present within complete exposure pathways have the potential to pose significant environmental risk; and (4) to determine if this potential for risk warrants additional ecological risk characterization.

The ERA was conducted in accordance with the following federal guidance:

- United States Environmental Protection Agency (USEPA). 1997. *Ecological Risk Assessment Guidance for Superfund* (ERAGS).
- USEPA. 2001. *The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments.*
- USEPA. 2015a. *EPA Region 3 BTAG – Frequently Asked Questions.* September.
- USEPA. 2018. *Region 4 Ecological Risk Assessment Supplemental Guidance*.

The ERA was informed primarily by the following documents related to the WFF:

- Versar. 2011. *Final Remedial Investigation Report*. Remedial Investigation of the Construction Debris Landfill NASA Wallops Flight Facility Accomack County, Virginia.
- AECOM 2020. *Supplemental Field Investigation Data Report Revision 2*. Project 15 Construction Debris Landfill Wallops Flight Facility, Wallops Island, Virginia. Contract No. 80KSC019D0010.

Potential ecological exposure was evaluated under current conditions using recent analytical data collected in relevant exposure media (i.e., surface soil, sediment, surface water, and pore water). Exposures were evaluated for four source areas of concern (AOCs) and several nearby wetland areas potentially impacted by overland flow and groundwater to surface discharge.

The scope of this ERA report includes Steps 1 and 2 of the 8-step ERAGS process (also referred to as a Screening Level Ecological Risk Assessment [SLERA]). Steps 1 and 2 were used to identify COPECs in potentially affected environmental media to support a scientific management decision point (SMDP) regarding the need for further risk characterization and/or remediation. The list of COPECs was refined consistent with the initial stage of a Baseline Ecological Risk Assessment (BERA) Step 3 (referred to as Step 3a COPEC Refinement) to reduce uncertainty in the SLERA Step 1 and 2 conclusions and to refine the recommendations presented in the report by applying more realistic exposure assumptions.

The results of the SLERA and BERA Step 3a COPEC Refinement were used to reach one of the following conclusions for this ERA Report:

- There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk;
- The information is not adequate to make a decision at this point, and the ecological risk assessment process will continue to Step 3; or
- The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

# 2. Step 1: Screening Level Problem Formulation and Ecological Effects Evaluation

The following fundamental components were evaluated as part of Step 1 of the ERA preliminary ecological screening assessment:

- Identify ecological setting and potential habitats
- Identify potential ecological receptors
- Identify constituents known or suspected to exist at the WFF
- Evaluate potential migration pathways that exist at the WFF
- Characterize fate and transport mechanisms
- Describe constituent ecotoxicological properties
- Confirm potentially complete migration pathways and ecological receptors that might exist at the WFF
- Identify assessment and measurement endpoints
- Identify conservative ecological screening benchmarks

## 2.1 Ecological Setting and Potential Habitats

The ecological setting of WFF was characterized using information from the results of the supplemental field investigation (SFI). **Figure 2-1** presents a layout of the WFF. This information was supplemented with resources from the Virginia Department of Environmental Quality (VDEQ), United States Forestry Service (USFS), United States Fish and Wildlife Service's (USFWS's) National Wetlands Inventory (NWI), Natural Resources Conservation Service (NRCS), and aerial imagery. Soils and potential habitats within or near the Site are summarized below.

### 2.1.1 Soils

**Table 2-1** summarizes the soil types occurring in and around the AOCs present at WFF. Based upon online NRCS soil mapping, there are four soil types present within the WFF – Bojac fine sandy loam, 0 to 2 percent (%) slopes, Chincoteague silt loam, 0 to 1% slopes, Magotgha fine sandy loam, 0 to 2% slopes, and Molena loamy sand, 6 to 35% slopes. The Molena loamy sands are the predominant soil type across the WFF with the 6 to 35% slopes covering over 90% of the DUs. The Magotgha fine sandy loams and Chincoteague silt loams are associated with the wetland area found within the CDL boundary which abuts both the AOCs and the nearby Little Mosquito Creek.

NRCS (2020) describes Molena loamy sands as having a high infiltration rate (low runoff potential) when thoroughly wet, and consisting mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission. These soils have a higher permeability and a higher percentage of coarser sands.

The Magotgha fine sandy loams are associated with the tidal wetland areas which exist within the CDL boundary directly to the north and east of the AOCs. Magotgha fine sandy loams typically occur in salt marshes on coastal plains. The parent material consists of marine sediments. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement is considered moderately high in the most restrictive layer, and the soil is frequently flooded (NRCS, 2020).

### 2.1.2 Terrestrial Habitats

WFF is located within the Middle Atlantic Coastal Plain Level III Ecoregion, associated with the more general Mississippi Alluvial and Southeast USA Coastal Plains, and Eastern Temperate Forests Level II and Level I Ecoregions, respectively (USEPA, 2013). This ecoregion extends from Delaware to the South Carolina/Georgia border and consists of low elevation flat plains, with many swamps, marshes, and estuaries. Its low terraces, marshes, dunes, barrier islands, and beaches are underlain by unconsolidated sediments. WFF is also classified as the Eastern Shore subregion of the Outer Coastal Plain physiographic province as per the Virginia Department of Conservation and Recreation (VDCR) (Fleming, et. al, 2020). This region is defined by having the state's minimum relief (0m / 0ft, or mean sea level), and elevation does not exceed 18m (60ft). This area is part of a chain of large bay and marsh complexes and barrier islands with both active and stabilized dunes. These islands are dynamic landscapes that are constantly buffeted by powerful winds and waves, generally eroding on the ocean side and accreting on the sound side. The diversity of wetlands in this region spans a range of freshwater to mesohaline, lunar-tidal and wind-tidal estuaries; tidal and palustrine swamps; non-riverine groundwater-saturated flats; seasonally flooded ponds and depressions; seepage-slope wetlands; saturated peatlands; and various tidal and non-tidal aquatic habitats. Forty-six percent of Virginia's Coastal Plain is forested, including 38% of the uplands and 75% of the wetlands (Fleming, et. al, 2020).

The maritime zone of the Outer Coastal Plain is vegetated with a unique suite of pine and hardwood forests, dune woodlands and scrub, dune grasslands, and sparse beach vegetation — communities well adapted to deep sands, periodic salt spray, and oceanic storm impacts. The typical development of maritime vegetation proceeding along a gradient from the beach inland starts with the upper beaches and overwash flats that support a sparse assemblage of *Cakile edentula* (American Sea Rocket), *Salsola kali* (Saltwort), and a few other salt-tolerant, succulent annuals. The most mature maritime forests of the Eastern Shore generally consist of Loblolly Pine in mixtures with *Prunus serotina var. serotina* (Black Cherry) and several oaks. Maritime-zone wetlands include some of the state's rarest natural communities, including sea-level fens, interdune ponds and wet grasslands, and maritime swamp forests (Fleming, et. al, 2020).

### 2.1.3 Aquatic and Semi-Aquatic Habitats

Bounded on the north and east by Little Mosquito Creek, Simoneaston Bay to the east, and Wattsville Branch to the west, WFF sits just above mean sea level (amsl) at 20 to 30 feet amsl. Additionally, a narrow creek channel that parallels the larger Mosquito Creek bounds the site on the east. The National Wetlands Inventory (NWI) mapper classifies the aquatic and semi-aquatic habitats as Estuarine and Marine Deepwater (E1UBL), which consists of deep-water tidal

habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines, there is appreciable dilution of sea water.

Offshore areas with typical estuarine plants and animals, such as red mangroves (Rhizophora mangle) and eastern oysters (Crassostrea virginica), are also included in the Estuarine System. The substrate in these habitats is continuously covered with tidal water (i.e., located below extreme low water) (NFWS, 2020a). Estuarine water regimes and water chemistry are affected by one or more of the following forces: oceanic tides, precipitation, freshwater runoff from land areas, evaporation, and wind. Estuarine salinities range from hyperhaline to oligohaline. These Estuarine Systems include both estuaries and lagoons. It is more strongly influenced by its association with land than is the Marine System. In terms of wave action, estuaries are generally considered to be low-energy systems (Cowardin et.al, 1979).

Deepwater Marine Habitats are permanently flooded lands lying below the deepwater boundary of wetlands. Deepwater habitats include environments where surface water is permanent and often deep, so that water, rather than air, is the principal medium within which the dominant organisms live, whether or not they are attached to the substrate. As in wetlands, the dominant plants are hydrophytes; however, the substrates are considered nonsoil because the water is too deep to support emergent vegetation (U.S. Soil Conservation Service, Soil Survey Staff 1975). The VDCR defines this area as part of the Marine System Natural Community which includes Upper Beaches and Overwash Flats.

### 2.1.4 Wetland Habitats

In general terms, wetlands are lands where saturation with water is the dominant factor determining the nature of substrate development and the types of plant and animal communities living in the substrate and on its surface. Unlike the aquatic Estuarine and Marine Deepwater habitats, most wetland substrates also qualify as “soil” (FGDC, 2013). Wetlands and deepwater habitats are defined separately because traditionally the term wetlands have not included deep, permanent water; however, both must be considered in any investigation. This transitional area is critical to defining potential exposure pathways for both aquatic and terrestrial receptors.

The NWI map overlay for the area of the WFF indicate that both tidal and non-tidal wetlands occur at the site. There are three predominant kinds of wetlands at WFF, including marine, estuarine, and palustrine wetlands. The NWI map indicates many large areas of estuarine wetlands adjacent to the main base, with several smaller parcels of palustrine forested wetlands (USFWS, 2020a). The Estuarine Systems, which cover more than 100 acres of land near the WFF site including the areas of natural deposition from the site AOC’s are classified by the NWI as Estuarine and Marine Wetland (E2EM1N), which are similarly described as the aquatic habitats in the previous subsection but with important distinctions which make it unique.

### 2.1.5 Critical and Sensitive Habitats

No federal critical habitats are located within the direct vicinity of the WFF (USFWS, 2020b and 2020c). Sensitive habitats on and adjacent to the WFF include the Chincoteague National

Wildlife Refuge and the Assateague Island National Seashore to the immediate north, and the Wallops Island National Wildlife Refuge which borders the main base to the west. These refuges are federal and state protected areas for both migratory and nonmigratory wildlife. Other sensitive habitats at the WFF include habitat for federally listed threatened and endangered species and wetlands as well as estuarine habitats such as Mosquito Creek, Chincoteague Bay, and Hog Creek.

Although no specific habitat was identified within or near the WFF, the VDCR National Heritage Database Search (https://vanhde.org/species-search ) indicated that listed threatened species and species of concern (Loggerhead (Sea Turtle) [Caretta *caretta*]) and migratory birds (Saltmarsh Sparrow [Ammospiza *caudacuta*], Piping Plover [Charadrius *melodus*], and Peregrine Falcon [Falco *peregrinus*]) have large ranges that may overlap the WFF (VDCR, 2020). A thorough review of threatened and endangered (T&E) species is provided in **Section 2.2.2**.

## 2.2 Potential Ecological Receptors

Potential ecological receptors that might be expected to occur throughout the WFF were identified using habitat type and species information published in literature. This information was supported by state resources published by the VDCR, such as *Virginia Natural Heritage Data Explorer* (VDCR, 2020). The sections below include both commonly occurring wildlife and a review of sensitive habitats and applicable T&E species.

### 2.2.1 Commonly Occurring Wildlife

Groups of commonly occurring wildlife include soil macroinvertebrates, amphibians and reptiles, birds, and mammals. Wildlife likely to be encountered within or near the WFF are briefly discussed below:

- Soil and benthic macroinvertebrates
    - Soil macroinvertebrates can occupy any portion of the WFF with a defined soil layer. Common terrestrial soil macroinvertebrates include macrofauna such as earthworms, woodlice, millipedes, and beetles; mesofauna including springtails, mites, and potworms; and microfauna such as nematodes.
- Benthic macroinvertebrates could occur within the any of the aquatic and semiaquatic habitats within the WFF (i.e., Little Mosquito Creek, drainage channels or tributaries, wetlands, and areas which are ponded or frequently flooded). Common benthic macroinvertebrates include freshwater snails, crustaceans, beetles, and larval stages of many emergent aquatic insects (i.e., midges, dragonflies, damselflies, mosquitoes, blackflies, and mayflies).
- Amphibians and reptiles
    - The wooded areas, scrub, marshes, and wetlands within the WFF may provide habitat such as damp leaf litter, moist crevices within trees, fallen trees or logs, submerged structures, and/or banks that may be used by reptiles and amphibians.

  - Commonly occurring reptiles and amphibians may include the green tree frog (*Hyla cinerea*), bullfrog (*Rana catesbeiana*), southern leopard frog (*Rana sphenocephala*), red back salamander (*Plethodon cinereus*), eastern hog-nosed snake (*Heterodon platyrhinos*), northern brownsnake (*Storeria dekayi dekayi*), northern water snake (*Nerodia sipedon sipedon*), ring-necked snake (*Diadophis punctatus*), spotted turtle (*Clemmys guttata*), eastern box turtle (*Terrapene carolina carolina*), eastern mud turtle (*Kinosternon subrubrum subrubrum*), common snapping turtle (*Chelydra serpentina serpentine*), atlantic green sea turtle (C*helonia mydas mydas*), atlantic ridley sea turtle (*Leidochelys Kempi*), leatherback sea turtle (*Dermochelys coriacea*), atlantic hawksbill sea turtle (*Eretmochelys imbricata*), and five-lined skink (*Eumeces fasciatus*).

- Birds
  - Birds most likely to be found within the WFF would make use of open grass/shrub areas, and/or nearby forested/shrub wetlands. Additionally, predatory birds may use tall canopy trees to hunt small birds and mammals feeding within the WFF.
  - Commonly occurring birds may include American kestrel (*Falco sparverius*), black and white warbler (*Mniotilta varia*), common grackle (Quiscalus *quiscula*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), brown-headed cowbird (*Molothrus ater*), American crow (*Corvus brachyrhynchos*), downy woodpecker (*Picoides pubescens*), eastern bluebird (*Sialis sialis*), and American robin (*Turdus migratorius*).

- Mammals
  - Common interior forest and mixed woodland species would likely enter the WFF and feed on ground vegetation/shrubs, soil invertebrates, and small mammals. Aquatic and semi-aquatic species would likely feed on vegetation or macroinvertebrates within the adjacent wetland areas.
  - Commonly occurring species may include white-tailed deer (*Odocoileus virginianus*), Virginia Oppossum (*Didelphis Virginiana*), red fox (*Vulpes vulpes*), raccoon (*Procyon Lotor*), eastern cottontail (*Sylvilagus Floridanus*), meadow jumping mouse (*Zapus Hudsonius*), meadow vole (*Microyus Pennsylvanicus*), eastern gray squirrel (*Sciurus carolinensis*), muskrat (*Ondatra Zibethicus*) and little brown bat (*Myotis Lucifugus*).

### 2.2.2 Threatened and Endangered Species

Both federal (USFWS, 2020c) and VDCR (https://vanhde.org/species-search) resources were queried to identify T&E species. Species listed by these sources are provided in **Table 2-2**. Rationale for the potential to occur at the WFF was supplemented by NatureServe Explorer (http://explorer.natureserve.org/index.htm).

## 2.3 Potential Source Areas and Constituents of Interest

Because of historic Department of Defense actions at or surrounding the WFF CDL, the primary COIs are metals associated with former training activities, VOCs, SVOCs, and Dioxins/Furans associated with former dumping and burning activities. The subsections below summarize the historical context of the WFF and findings of the previous RI field investigation (Versar, 2011).

### 2.3.1 Facility History

The site ownership and use, as summarized from the final RI (Versar, 2011), is presented in this section. Prior to development of the Site by the U.S. government, the current WFF property was farmland and marshland. The Department of Navy acquired the property in 1942 and established a World War II training facility, the Naval Auxiliary Air Station, for naval aviators. The original runways and buildings have been modified and extended, as needed, to accommodate the evolving mission of the facility. Accordingly, the WFF property has experienced periods of construction and demolition of runways, buildings, and roadways.

The Navy discontinued naval training operations at the facility in 1959 when NASA took custody of the Main Base as well as the northern portion of Wallops Island and the Mainland; the property transfer was finalized in 1961. From 1959 to 1974, the three areas were known as Wallops Station and were used for support of the Civilian Space Program.

NASA excised approximately 397 acres of the Main Base to the U.S. Fish and Wildlife Service in 1975. The official facility name was changed to Wallops Flight Center that same year. In 1981, Wallops Flight Center was consolidated with Goddard Space Flight Center, and the name of the facility changed again to Wallops Flight Facility. WFF is currently used as a suborbital and orbital rocket launch site to support NASA and other state and federal missions.

### 2.3.2 Current Investigations

As determined by the Final Remedial Investigation Report, Remedial Investigation of the Construction Debris Landfill, NASA Wallops Flight Facility, Accomack County, Virginia (Versar, 2011) and Revised Draft FS (CDM Smith, 2018), additional data collection activities were conducted to provide data required to update the HHRA and ERA and report the changes in HHRA and ERA addenda. The potential source is direct releases to soil, sediment, groundwater, surface water and porewater from past waste disposal activities. A total of four AOCs were evaluated for this ERA and are presented in **Figure 2-1**.

The four areas of concern (AOCs) at the Project 15 CDL (the Site) in the remedial investigation (RI) were identified as and described by the nature of the apparent historical use as follows:

- Northern AOC – Disturbed Ground – This AOC was an area of disturbed ground in 1949 that was an excavation in 1954.
- Central AOC – Mounds of Material – This AOC was an area with several mounds of unidentified material in 1954 and was an excavation by 1959.
- Southern AOC – Burning Dump – This AOC was an area of disturbed ground with two man-made channels; the AOC's use as a burning ground was confirmed on a 1950 site map.

- Western AOC – Shallow Excavation – This AOC is interpreted to be a shallow excavation that is now located inside the runway area fence.

## 2.4 Identification and Evaluation of Migration Pathways

An ecological conceptual site model (ECSM) was developed to depict the source areas, exposure media, and migration pathways used to identify significant exposure pathways for evaluation in the ERA (**Figure 2-2**). The ECSM includes the following information:

- Potential source area(s)
- Potential migration pathways
- Exposure media
- Complete and incomplete exposure pathways for potential ecological receptors via the following exposure routes:
    - Direct contact/absorption
    - Direct or incidental ingestion of substrate
    - Ingestion of prey and plant dietary items

**Potential Source Area(s)**

The four potential source areas have been identified within the WFF including the Northern AOC, Southern AOC, Central AOC, and Western AOC. These areas have been identified by previous and current investigations (Versar, 2011) to have been significantly impacted by historical training and construction debris dumping activities. The source areas are related solely to historical impacts.

**Potential Migration Pathway(s)**

The evaluation and identification of potentially complete migration pathways is one of the primary goals of a screening level ecological risk assessment (USEPA, 1997).

As defined, a “migration pathway” is the pathway by which a constituent travels from a source to receptors. A pathway can involve multiple media such as erosion of soil from upland to wetland areas, or volatilization to the atmosphere. Historical direct releases to soil and subsequent erosion/dissolution into groundwater and transport to the wetland area represent the primary release mechanisms within the WFF.

Migration pathways evaluated within the ERA include:

- Erosion of surface soil
    - Contamination in surface and subsurface soils were confirmed by the RI report (Versar, 2011) at the CDL Site. These constituents present in the soil as a result of burial and burning of debris are subject to physical, biological, and chemical reactions that directly influence their persistence and potential migration.
    - Given the WFF topography and site orientation, stormwater runoff from significant rain events is possible to transport suspended COIs off-Site to the nearby wetland area and Little Mosquito Creek northeast of the AOCs. While the more heavily vegetative area that exists in between the WFF site boundary

and the wetland / Little Mosquito Creek could potentially serve as a barrier to slow the transmission of come contamination, there is still the possibility that COIs could migrate to this wetland area.

- Groundwater discharge
    - Waste materials at the CDL Site were buried and burned on the ground at the Central and Southern AOCs. Their impact to groundwater, therefore, is derived by leaching through soil to groundwater.
    - The unconfined groundwater system flowing beneath the CDL Site discharges at the small man-made drainage channels and the tidal channel of Little Mosquito Creek that forms the eastern boundary of the site. Therefore, the maximum extent of groundwater contamination is defined by this surface water feature.
    - 27 wells have been installed on-site: 17 shallow wells, 4 deep temporary wells, and 6 monitoring wells.
    - Groundwater discharge at the sites indicated above may potentially occur as upwelling within the groundwater-surface water (GW-SW) transitional zone or hyporheic zone (HZ). The USEPA (2008a) defines the GW-SW transition zone as “a region beneath the bottom of a surface-water body where conditions change from a ground-water dominated to surface-water dominated system within the substrate”. The transitional zone also includes the HZ, which represents the interface of groundwater, sediment, sediment pore water, and surface water. USEPA (2008a) defines the HZ as a “latticework of underground habitats through the sediments associated with the interstitial waters in the substrate beneath and adjacent to moving surface-waters.”

## 2.5 Fate and Transport Characteristics

This sub-section discusses constituent fate and transport processes in potentially affected media within or near the WFF.

### 2.5.1 Terrestrial Media

Site-related COIs detected in terrestrial media (i.e., surface soils) include metals (i.e., antimony, copper, lead, and zinc). Within soil, metals can be found in multiple states including dissolved in soil solution, adsorbed on inorganic soil constituents, precipitated as solids, or present in the structure of primary and secondary minerals (Shuman, 1991).

Additionally, the fate and transport of a metal in soil depends significantly on the chemical form and speciation of the metal (USEPA, 1992). Once in the soil, metals are initially adsorbed, and then subjected to adsorption reactions. The adsorption of metals is associated with pH, redox potential, clay content, soil organic matter, iron and manganese oxides, and carbonate content. Adsorption results in metals being transformed into different chemical forms that vary with respect to bioavailability, mobility, and toxicity.

### 2.5.2 Aquatic and Semi-Aquatic Media

Within this ERA, aquatic and semi-aquatic potentially impacted media include groundwater, sediment porewater, surface water, and sediment. While erosion of impacted soils to the adjacent wetland area bordering Little Mosquito Creek is unlikely, groundwater discharge may have introduced COIs within impacted media from source areas within the AOCs to the wetland area.

Metals partition between solid and liquid phases in aquatic and semi-aquatic environments. Partitioning is based on the available ligands and the strength of the potential metal-ligand complexes. The release of metals from solid phases to liquid phases governs the bioavailability and toxicity of metals. Metals are subjected to biogeochemical processes and conditions that influence their partitioning, including the redox state of sediment and pH of the interstitial water. The microbial degradation of organic matter influences redox conditions across the sediment-surface water interface (Baker, 1994; Stumm and Morgan, 1981; Charriau et al., 2011). Generally, metal mobility increases at low pH and decreases as pH increases, at which point greater sorption occurs (USEPA, 2007a).

As a result of this partitioning, the bioavailability and toxicity of metals in aquatic and semi-aquatic media is associated with the exchangeable fraction of metals in the dissolved phase rather than the total phase metal concentration (USEPA, 2007a). The majority of metals in sediment porewater are complexed by colloids, and do not exist as freely dissolved metal-ion complexes (Burgess et al., 1996). Therefore, concentrations of metals measured in filtered porewater samples more accurately represent the dissolved fraction of metals, which is bioavailable and can be incorporated into the tissues of benthic invertebrates, rather than bulk sediment concentrations (USEPA, 2005).

### 2.5.3 Biota

Bioaccumulation represents the potential for a constituent to accumulate in the tissues of an organism. In those instances where bioaccumulation exceeds the ability of an organism to metabolize those constituents, toxic effects can potentially be observed. Wildlife ingesting prey with body burdens of lipophilic compounds may also experience adverse effects when accumulation reaches a threshold level. The purpose of evaluating bioaccumulation potential is to describe the potential of constituents to bioaccumulate in tissues and potentially exert a toxic effect and/or expose upper trophic wildlife receptors through ingestion pathways.

Heavy metals encountered at the WFF, including methylmercury, are known to bioaccumulate and biomagnify (USEPA, 2000). The implications of biomagnification are that even a low concentration of a metal in environmental media or diet items can result in a high enough dosage that adverse effects for birds and mammals may potentially be observed. Metals can bioaccumulate to a point where the concentrations may become a significant source of dietary metal to their predators. Wildlife based screening levels presented in **Section 2.10** of this ERA are protective of potential bioaccumulation.

## 2.6 Ecotoxicological Profiles

This section summarizes the general ecotoxicological effects associated with WFFs COIs including VOCs, SVOCs, pesticides, PCBs, dioxins/furans, cyanide, and metals.

### 2.6.1 Volatile Organic Compounds

Volatile organic compounds (VOCs) are a subcategory of organic compounds with a high vapor pressure at room temperature such as acetone, toluene, benzene, tetrachloroethylene [PCE], trichloroethylene [TCE], vinyl chloride, and xylene. High volatility means that air is the most important environmental media for this group of compounds, and inhalation is likely to be the exposure route of concern (USEPA, 2020a). The relatively high Henry's law constants of site VOCs indicate that they may volatilize from the groundwater into the soil pore space in the unsaturated zone. Once in the soil pore space, VOCs can migrate upward through the soil and discharge to the atmosphere at the ground surface (USEPA, 2005; USEPA, 2007). The health effects from exposure to VOCs vary depending on the particular VOC and the length and route of exposure. Individual VOCs have been associated with impacts to the immune system, hepatic system, blood and fetal development delays (DOE, 2020).

### 2.6.2 Semi-Volatile Organic Compounds

Semi-volatile organic compounds (SVOCs) are a subgroup of VOCs that tend to have a higher molecular weight and higher boiling point temperature. SVOCs encompass a large number of different organic chemicals with unique properties affecting their transport through the environment as well as their toxicity and mode of action. Examples of commonly encountered SVOCs include plasticizers, chlorinated phenols and ploy aromatic hydrocarbons (described further below). The health effects from exposure to SVOCs vary depending on the particular SVOC, the length of exposure, and individual SVOCs have been associated with impacts to the respiratory system, endocrine and thyroid disruption, reproductive toxicity, and development delays (USEPA, 2016a).

#### 2.6.2.1 Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs occur in the environment as complex mixtures (USEPA, 2009a) and are considered Type I narcotic constituents (Verhaar et al., 1992). The predominant mechanism of PAH toxicity to macroinvertebrates is non-polar narcosis, which results in the alteration of cell membrane function and can then result in mild toxic effects or mortality depending upon the duration and intensity of the exposure (USEPA, 2009a). The potential effects of PAH-induced narcosis on benthic invertebrate communities can include decreased abundance, diversity, and growth (Environment Canada, 1999). Typically, PAHs adsorb readily to organic material and fine particles in soil, and most have very low solubility. When released to soil, these compounds will adhere to the soil particles and may be transported through surface runoff to sediment in water bodies. A small percentage may dissolve and percolate to groundwater.

### 2.6.3 Pesticides

Pesticides are used to prevent, destroy, repel, or mitigate pests including insects, mice and other animals, weeds, or fungi as well as to kill organisms that can cause diseases such as bacteria and viruses. These products contain both active ingredients and inactive, or inert, ingredients and may include organic or inorganic components. There are a large number of different pesticide formulations with unique properties affecting their transport through the environment as well as their toxicity and mode of action. Application of pesticides has been

widespread and exposure to environmental receptors may occur through a variety of pathways depending on the specific pesticide used and the attributes of the ecosystem to which it is applied (USEPA, 2020). The health effects from exposure to pesticides vary depending on the particular pesticide and the length and route of exposure. Individual pesticides have been associated with impacts to the hepatic and nervous systems.

### 2.6.4 Polychlorinated Biphenyls (PCBs)

PCBs are a group of synthetic organic chemicals that can cause a number of different harmful effects. There are no known natural sources of PCBs in the environment. PCBs typically enter the environment as mixtures containing a variety of individual chlorinated biphenyl components, known as congeners, as well as impurities. Because they don't burn easily and are good insulating materials, PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in the United States in August 1977 because there was evidence that PCBs build up in the environment and may cause harmful effects. Consumer products that may contain PCBs include old fluorescent lighting fixtures, electrical devices or appliances containing PCB capacitors made before PCB use was stopped, old microscope oil, and old hydraulic oil. PCBs adhere strongly to soil and will not usually be carried deep into the soil with rainwater. They do not readily break down in soil and may persist in the soil for months or years; generally, the more chlorine atoms that the PCBs contain, the more slowly they break down. PCBs can accumulate in the leaves and above-ground parts of plants and food crops as well as in the bodies of small organisms. When these plants or organisms are prey for larger animals, PCBs may bioaccumulate in the tissue of these predators (ATSDR, 2000). The health effects from exposure to PCBs vary depending on the particular PCB and the length and route of exposure. Individual PCBs have been associated with impacts to the nervous system and reduced body weight.

### 2.6.5 Dioxins and Furans

Dioxins and furans include a family of toxic substances that share a similar structure. Most dioxins and furans are not man-made or produced intentionally but are created when other chemicals or products are made. When released into water, they are likely to attach to soil and sediment particles which may then settle to the bottom sediment of the water body. Chlorinated dioxins have the potential to accumulate in animals, resulting in measurable levels in animals higher in the food chain. Ingestion is the primary method of exposure and uptake of chlorinated dioxins to animals. Exposure in animals can lead to weight loss, liver damage, and disruption of the endocrine system. In many species of animals, chlorinated dioxins weaken the immune system and cause a decrease in the system's ability to fight bacteria and viruses. In other animal studies, exposure has caused reproductive damage and birth defects. Some animal species exposed to dioxins and furans during pregnancy had miscarriages and the offspring of animals exposed to chlorinated dioxins during pregnancy often had severe birth defects including skeletal deformities, kidney defects, and weakened immune responses. Animal studies have also shown an increased risk of cancer from exposure to CDDs (ATSDR, 1998).

### 2.6.6 Cyanide

Cyanide is a chemical group consisting of one atom of carbon connected to one atom of nitrogen by three molecular bonds (C≡N) and cyanides are compounds that contain a cyanide group. Cyanides can both occur naturally or be man-made and many are powerful and rapid-

acting poisons. Simple cyanide salts (sodium cyanide and potassium cyanide) are common examples of cyanide compounds. Certain bacteria, fungi, and algae can produce cyanide, and cyanide is found in a number of foods and plants. Many of the cyanides in soil and water come from industrial processes. The major sources of cyanides in water are discharges from some metal mining processes, organic chemical industries, iron and steel plants or manufacturers, and publicly owned wastewater treatment facilities. Other cyanide sources include vehicle exhaust, releases from certain chemical industries, burning of municipal waste, and use of cyanide-containing pesticides. Most cyanide in surface water will form hydrogen cyanide and evaporate. Cyanides are fairly mobile in soil. Once in soils, cyanide can be removed through several processes. Consequently, cyanides usually do not seep into underground water. Exposure to cyanide can affect the neurological system and result in impaired reproduction (ATSDR, 2006).

### 2.6.7 Metals

The toxicity of metals depends on the solubility and bioavailability of the particular metal. It is assumed that the water-soluble fraction in soil or sediment exhibits the greatest potential for adverse ecological risk because it is directly available for uptake by organisms.

The bioavailability and toxicity of metals in soil are influenced by soil physiochemical characteristics, including the quantity and type of organic carbon. For these reasons, the concentration of a metal in bulk soil does not represent its bioavailability or potential for toxicity (Allen and Janssen, 2006; Thakali et al., 2006a and 2006b). Rather, the bioavailable and toxic form of metals is found in the soil solution (Thakali et al., 2006a and 2006b). Metals either exist in the soil solution as free (uncomplexed) metal ions in soluble complexes with inorganic or organic ligands or associated with mobile inorganic and organic colloidal material. Common inorganic ligands are sulfate ($SO_4^{2-}$), chloride ($Cl^-$), hydroxide ($OH^-$), phosphate ($PO_4^{3-}$), nitrate ($NO_3^-$), and carbonate ($CO_3^{2-}$). Common organic ligands include low molecular weight aliphatic, aromatic, and amino acids and soluble constituents of fulvic acids.

The bioavailability and toxicity of metals in sediment and water are influenced by physiochemical characteristics, including the quantity and type of organic carbon, which affects the partitioning of constituents between soil/sediment and porewater. The freely dissolved concentrations of constituents in sediment porewater are the most direct indicator of constituent bioavailability and partitioning. Based on this principle, equilibrium partitioning theory may be used to predict the toxicity of metals in sediment based on the partitioning of simultaneously extracted metals between acid volatile sulfides, organic carbon, and porewater (USEPA, 2005a; USEPA, 2007). Because of these partitioning relationships, site-specific information regarding the factors that mitigate the bioavailability and toxicity of COIs in sediment is fundamental to the assessment of potential impacts to ecological receptors. The health effects from exposure to metals vary depending on the particular metal and the length and route of exposure. Individual metals have been associated with impacts to the urinary system, muskuloskeletal system, blood and reduced body weight.

## 2.7 Exposure Routes and Receptors Not Evaluated

This section provides the rationale for exposure routes and receptors not selected for further evaluation.

### 2.7.1 Terrestrial Plants

This ERA report indirectly evaluates and remains protective of plant communities that may inhabit the WFF. Ecological screening values (ESVs) protective of plants were used in the direct contact evaluation. For some COIs, plant-based benchmarks were less conservative than other benchmarks used during the ERA. Of the potential ecological receptors that are present at WFF, plants are not the most sensitive to the potential effects of site-related COIs (Suter et al., 2000). For example, unlike herbicides, the toxic and bioaccumulative effects of Site-related metals and explosives on plants may be mitigated by biotransformation, volatilization, and/or sequestration in root tissues.

### 2.7.2 Amphibians and Reptiles

A standardized ecotoxicological methodology has not been established, and currently, there are very few established methods to evaluate the toxicity of chemical stressors for amphibians. Also, existing ecotoxicological methods are unlikely to predict adverse ecotoxicological effects in support of the ERA (Johnson et al., 2017). Ecotoxicological data for amphibians are limited. The majority of the available ecotoxicological data on amphibians are from acute exposures in aquatic test systems (Johnson et al., 2017). Because of the conservatism in Step 1 and Step 2 of the ERA, acute ecotoxicological data will not support the assessment and measurement endpoints. Additionally, surrogate species cannot be used. Definitive comparisons with surrogate species, e.g., fish, are difficult to achieve because of variability in study design (Birge et al., 2000; Johnson et al., 2017). Despite these limitations, amphibians will be indirectly evaluated within the ERA. The proposed conservative screening approach for sediments is intended to be protective of any sensitive aquatic organism.

### 2.7.3 Water Column Community

The water column community was not explicitly evaluated within this ERA. Dissolution of COIs from resuspended sediment and groundwater discharge into surface water could expose water column organisms to unacceptable concentrations of COIs within and adjacent to the AOCs. ESVs used within this ERA to evaluate benthic macroinvertebrate exposure in surface water are indirectly protective of the water column community. For some COIs, water column organisms (daphnids) were considered during the development of chronic ESVs for surface water (Suter and Tsao, 1996).

### 2.7.4 Fish

This ERA report indirectly evaluates and remains protective of fish communities that may inhabit the estuarine environment downgradient of WFF. During ESV selection, criteria for fish were considered for sediment and water direct contact pathways (minimum of benthic macroinvertebrates and fish). The benthic macroinvertebrate community will be used as a surrogate endpoint to remain protective of direct contact and exposure. Additionally, birds and mammals will be used to evaluate the impacts of bioaccumulation and biomagnification through the food chain.

## 2.8 Receptors of Concern and Exposure Routes Selected for Evaluation

Based on the evaluation of the chemical and fate and transport characteristics of COIs across the WFF site, direct contact exposures to soil, sediment, sediment porewater, and surface water are the primary routes of exposure to ecological receptors within and near the site. Additionally, wildlife ingestion exposure pathways are also relevant due to the potential for COIs to bioaccumulate from environmental media (i.e., soil/sediment into the tissues of prey items).

Selection of potential receptors was driven by the availability of data in potentially affected habitats within and near the WFF. Given that direct contact and dietary exposure to metals are the primary exposure pathways/routes to ecological receptors, receptors of concern identified for evaluation in the ERA include the following:

- Soil macroinvertebrate community
- Benthic macroinvertebrate community
- Terrestrial wildlife
    - Mammalian invertivore: Short-tailed shrew (*Blarina brevicauda*)
    - Mammalian herbivore: Meadow vole (*microtus pennsylvanicus)*
    - Mammalian carnivore: Red fox (*Vulpes vulpes*)
    - Avian invertivore: American robin (*Turdus migratorious*)
    - Avian herbivore: Northern bobwhite (*Colinus* virginianus)
    - Avian carnivore: Red-tailed hawk (*Buteo* jamaicensis)
- Aquatic and semi-aquatic wildlife
    - Mammalian invertivore: Raccoon (*Procyon lotor*)
    - Mammalian piscivore: American mink (*Neovison vison*)
    - Avian invertivore: Marsh wren (*Cistothorus palustris*)
    - Avian piscivore: Osprey (*Pandoin halieatus*)

Summaries of exposure pathways and rationale for selected sensitive receptor groups are presented in the following sub-sections.

### 2.8.1 Soil Macroinvertebrates

Soil macroinvertebrates are the most susceptible to the effects of COIs because of their sedentary nature and direct exposure to terrestrial soil. As a result of this exposure, soil macroinvertebrates are sensitive to both acute and chronic changes in soil quality. Exposure routes for soil macroinvertebrates include:

- Direct contact/absorption of soil
- Direct/incidental ingestion of soil

Soil macroinvertebrates such as earthworms can incorporate COIs into their tissues through feeding in soil and leaf litter, in addition to burrowing in affected soils. Because earthworms and other soil macroinvertebrates are relatively immobile, these species can potentially be exposed to a maximum constituent concentration in soil during the course of their lifetime (Suter et al., 1995).

Soil macroinvertebrates penetrate and exploit the surface soil layer to varying depths, which results in varying degrees of exposure. For example, epigeic species such as arthropods can be found at the surface layer in leaf litter. Whereas epi-endogeic species such as the European earthworm (*Lumbricus rubellus*) primarily reside near or at the surface, create horizontal burrows to feed and reproduce, and are found at soil depths of approximately 8 in bgs (Sackett et al. 2012). Anecic earthworm species such as the common earthworm (*L. terrestris*) create permanent vertical burrows in soil, which contain leaf litter and soil mixed from different depths of the profile and can extend to depths of 6.5 ft bgs (Scharenbroch and Johnston, 2011). *L. terrestris* will feed on leaves on the soil surface that they drag into the burrows. However, most exposure occurs within the biologically active zone (BAZ), which operationally extends to a depth of approximately 12 in bgs (USEPA, 2015b). Within this ERA, exposure pathways to soil macroinvertebrates are considered complete and greatest within surface soil

### 2.8.2 Benthic Macroinvertebrates

Similar to soil macroinvertebrates, benthic macroinvertebrates are sensitive to both acute and chronic changes in sediment/water quality due to their sedentary nature. Exposure routes for benthic macroinvertebrates and fish include:

- Direct contact/absorption of sediment, sediment porewater, and surface water
- Direct/incidental ingestion of sediment, sediment porewater, and surface water

Benthic macroinvertebrates are generally sedentary and susceptible to adverse changes in sediment and sediment porewater quality. Additionally, USEPA (2008a) indicates that benthic and epibenthic communities (e.g., invertebrate larvae, worms, and bivalves) spend part or all of their life cycle in contact with the sediments and groundwater that comprise the GW-SW transitional zone. For benthic macroinvertebrates, exposure occurs within the BAZ, which operationally extends from the surface water interface to a depth of approximately 6 in bgs for freshwater sediment (USEPA, 2015b). Within this ERA, exposure pathways to benthic macroinvertebrates are considered complete and greatest within surficial sediment.

### 2.8.3 Birds and Mammals

Exposure routes for birds and mammals include:

- Ingestion of prey items
- Incidental ingestion of soil (terrestrial)
- Direct/incidental ingestion sediment (aquatic and semi-aquatic)
- Direct/incidental ingestion of surface water (aquatic and semi-aquatic)

A significant proportion of the biological activity occurs within the top 0-12 in for soil and 0-6 in for sediment (USEPA, 2015b); although, fossorial mammals can be encountered at depths

reaching 2 ft (USEPA, 2018). Based on likelihood of exposure and availability of surface soil and sediment data, exposure pathways to wildlife are considered complete and greatest within the 0 to 2 ft and 0 to 6 in intervals, respectively. Wildlife receptors selected for the exposure evaluation are discussed in the following subsections.

#### 2.8.3.1 Meadow Vole (Terrestrial)

Optimal meadow vole habitat consists of moist, dense grassland with substantial amounts of plant litter. In most areas, meadow voles prefer habitats with dense vegetation. However, meadow voles are the most widely distributed grazing herbivore of its size and can be found anywhere in North America with some grass cover (USEPA, 1993). The diet of the meadow vole includes grasses, sedges, seeds, flowers, leaves, roots of shrubs and small trees, bark, tubers, bulbs, and occasionally insects. Given an array of habitat types, meadow voles prefer grassy areas with an abundance of green, succulent vegetation to wooded understories (USEPA, 1993). Within the WFF, the meadow vole was included in the screening level evaluations for areas that had accessible grassy areas as opposed to mostly forests or woodlands.

#### 2.8.3.2 Short-tailed Shrew (Terrestrial)

The short-tailed shrew occupies a range of habitat types, including wetlands and uplands, and is reported to occur in both forested and open habitats (Sample and Suter, 1994). Short-tailed shrews are active on the ground surface, in leaf litter, and below the ground surface. A well-developed leaf litter layer protects shrews from moisture and temperature extremes. Earthworms are reported to be the most important food item. Millipedes, slugs, snails, and insect larvae are also important prey items. Shrew will also prey on vertebrates when other food is not available and have shown sensitivity to bioaccumulative chemicals (USEPA, 1993). Additionally, the shrew is a common prey item for owls, raptors, fox, and other carnivores (USEPA, 1993). The short-tailed shrew is expected to occupy all areas of the WFF with a complete exposure pathway to surface soil. Within this ERA, the short-tailed shrew was evaluated assuming bioaccumulation of COIs into prey items (soil macroinvertebrates) from surface soil and incidental ingestion of substrate.

#### 2.8.3.3 Red Fox (Terrestrial)

Foxes prefer a habitat mosaic over homogeneous forested stands or open areas. The red fox is characterized as an old field or edge-species since it is commonly found in areas of forests interspersed with fields, cropland and/or grasslands. The fox has a wide dietary range but is predominantly carnivorous feeding mainly on rabbits and mice (USEPA, 1993). Lesser amounts of mammals, birds, snakes, invertebrates, and plant material are consumed. The red fox is expected to occupy all areas of the WFF with a complete exposure pathway to surface soil. Within this ERA, the red fox was evaluated assuming bioaccumulation of COIs into prey items (small mammals) from surface soil and incidental ingestion of substrate.

#### 2.8.3.4 Northern Bobwhite (Terrestrial)

Bobwhites are commonly found among grassland, shrubs, and emergent vegetative areas without highly developed canopy cover. They require shaded grassy areas with low-lying cover for nesting areas (USEPA, 1993). Bobwhites forage during the daytime and eat seeds, woody

plants, grasses, and other vegetation on the ground or within inches of the soil surface. Although chicks consume mainly invertebrates, juveniles and adults are largely herbivorous. Within the WFF, the bobwhite is likely only to occur in areas where there is a combination of early succession vegetation along forested areas or scrub/shrub areas with open woodland (Central, Northern, and Southern AOCs). Due to the bobwhite's nesting and foraging habits, they require some level of ground cover as well as open feeding areas. The bobwhite will be initially evaluated using an entirely plant diet to conservatively estimate the impact of COIs in surface soil.

#### 2.8.3.5 American Robin (Terrestrial)

American robins can be found in closed canopy forests, woodlands, fields, and residential areas. During the summer, they are most commonly observed foraging in cleared areas with short-stature herbs. The diet of the American robin includes fruits and insects. The diet varies seasonally such that invertebrates dominate the diet in the spring, whereas fruits dominate in the fall/winter (USEPA, 1993). The American robin could potentially occupy all areas within the WFF and is susceptible to localized impacts in soil. Within this ERA, the American robin was initially evaluated assuming bioaccumulation of COIs into prey items (soil macroinvertebrates) from surface soil and incidental ingestion of substrate.

#### 2.8.3.6 Red-tailed Hawk (Terrestrial)

Red-tailed hawks occupy a wide variety of open to semi-open habitats including coniferous, deciduous and mixed woodlands, woodland edges, grasslands, parklands, and agricultural fields with scattered trees (USEPA, 1993). Red-tailed hawks primarily consume small mammals such as meadow voles and short-tailed shrews, but also consume birds, reptiles, and some insects. The red-tailed hawk could potentially feed in any part of the WFF. The forests surrounding the WFF provide ample locations for nesting or perching and access to a variety of habitat areas. The red-tailed hawk is expected to occupy all areas of the WFF with a complete exposure pathway to surface soil/sediment. Within this SLERA, the red-tailed hawk was evaluated assuming bioaccumulation of COIs into prey items (small mammals) from surface soil/sediment and incidental ingestion of substrate.

#### 2.8.3.7 Raccoon (Aquatic and Semi-Aquatic)

The raccoon is the ubiquitous mammalian omnivore of North America, which can be found in a wide range of habitats including urban centers. Raccoons are opportunistic and will eat a wide range of food including but not limited to seeds, fruits, grains, invertebrates, amphibians, eggs, small mammals, and human refuse (USEPA, 1993). The largest populations of raccoons are supported by areas that have both woodland and trees for climbing/nesting and shallow water for foraging. Raccoons have adapted to almost all aquatic environments including swamps, mangroves, marshes, and coastline (USEPA, 1993).

Although a true omnivore, raccoons will be conservatively evaluated assuming a 100% invertebrate diet during the SLERA – the receptor's most sensitive dietary component to WFF's COIs. The raccoon was evaluated at all AOC sites with a complete exposure pathway to sediment and/or surface water (all aquatic and semi-aquatic habitats).

#### 2.8.3.8 Mink (Aquatic and Semi-Aquatic)

Mink are the most abundant and widespread carnivorous mammal in North America (USEPA, 1993) and will occupy primarily aquatic environments such as rivers, streams, and marshes (Sample and Suter, 1994). Mink have large home ranges that are dependent on habitat type (averaging 1.85- 2.63 kilometers linearly along streams and up to 770 hectares within open habitats; USEPA, 1993). Regardless of specific habitat type, mink are rarely found more than a couple hundred meters from water (USEPA, 1993).

The mink is an opportunistic carnivore, and the composition of a mink's diet will vary depending on habitat. Within traditional aquatic systems, mink feed along shorelines consuming invertebrates, fish, and amphibians. Within semi-aquatic or terrestrial environments (such as a woodland stream), mink predominantly consume small mammals, eggs, and birds (with a preference for muskrat).

Within this SLERA, mink are evaluated as an aquatic and semi-aquatic piscivore. They were conservatively evaluated as potentially complete receptors at all AOC sites with a complete exposure pathway to sediment and/or surface water (regardless of the presence of fish). If potential adverse impacts are identified in the SLERA, habitat selection and diet will be further refined during BERA Step 3.

#### 2.8.3.9 Marsh Wren (Aquatic and Semi-Aquatic)

Marsh wren frequent saltwater and freshwater marshes that contain permanent standing water from a few centimeters to about a meter (USEPA, 1993). Marsh wrens will eat insects directly from the water surface or emergent vegetation. Breeding marsh wrens will typically only occupy marshes larger than 0.4 hectares, and average male territory can be as low as 0.006 hectares (approximately 25 x 25 ft).

Within the WFF, the marsh wren will likely only occupy areas along waterways with adjacent wetlands. The tidal marsh / wetlands adjacent to Little Mosquito Creek contains optimal habitat for marsh wrens due to available sedges and grasses for nesting and shallow water depths for feeding. Conservatively, marsh wrens will be included in the aquatic and semi-aquatic evaluation of the AOCs which have wetlands adjacent to the Little Mosquito Creek.

#### 2.8.3.10 Osprey (Aquatic and Semi-Aquatic)

In the United States, the majority of osprey populations are associated with marine environments, but large inland rivers, lakes, and reservoirs also may support osprey (Henny, 1986 and 1988). Good nesting sites in proximity to open, shallow water and a plentiful supply of fish are the primary resources required for osprey success (Poole, 1989). The tops of isolated and often dead trees and man-made structures are preferred nesting sites. Osprey often nest in colonies (Poole, 1989). Osprey are almost completely piscivorous, although they have been observed on occasion taking other prey including birds, frogs, and crustaceans (Brown and Amadon, 1968). Their prey preferences change seasonally with the abundance of the local fish (Edwards, 1988; Greene et al., 1983).

Within the WFF, the osprey will likely occupy areas along the Little Mosquito River adjacent to the Northern, Central, and Southern AOC sites. Within this SLERA, the osprey was evaluated

assuming bioaccumulation of COIs into prey items (fish) from sediment and incidental ingestion of substrate/water.

## 2.9 Assessment and Measurement Endpoints

An assessment endpoint is an explicit expression of the environmental value that is to be protected. Because of the nature of potential contaminants and the receptors of concern (macroinvertebrates, birds, and mammals), general assessment endpoints of maintenance of the upland, terrestrial community (WFF) and nearby aquatic and semi-aquatic communities (Little Mosquito Creek and wetlands) composition are selected.

Measurement endpoints are the measurable ecological characteristics that are related to the assessment endpoints. Measurement endpoints were selected based on their direct relationship to the maintenance of the respective receptor populations. Hence, potential adverse effects on survival, reproduction, and growth are selected as the measurement endpoints. The assessment endpoint(s) and their associated measurement endpoint for the representative receptors are shown below in **Table 2-3**.

## 2.10 Ecological Screening Benchmarks

The maximum concentrations of COIs from each exposure area were compared to their respective chronic ESVs to identify COPECs for each sample medium. The screening-level effects evaluation establishes constituent exposure concentrations that represent thresholds for adverse effects. Benchmarks representing no observed effects concentrations (NOECs) were used preferentially during Step 2. Screening levels used within this ERA are presented in **Attachment A**. The hierarchy used to identify conservative screening benchmarks established for the selection of COPECs in each medium is presented below.

- Direct Contact
    - Surface soil ESVs were selected as the minimum of either terrestrial plant or soil macroinvertebrate benchmarks. The following hierarchy of sources was used to identify terrestrial, direct contact ESVs.
        - USEPA (2008b). Ecological Soil Screening Levels (USEPA Eco-SSLs).
        - USEPA (2018). USEPA Region 4 ESVs.
        - USEPA (2003). USEPA Region 5 Ecological Screening Levels (ESLs).
        - LANL (2017). Los Alamos National Laboratory (LANL) NOEC ESLs.
    - Sediment and surface water/pore water ESVs were selected as the minimum freshwater or saltwater value for benthic macroinvertebrates, fish, or general aquatic community organisms. The following hierarchy of sources was used to identify aquatic and semi-aquatic, direct contact ESVs.
        - USEPA (2006). Region 3 Biological Technical Assistance Group (BTAG) Screening Values.
        - USEPA (2018). USEPA Region 4 ESVs.
        - USEPA (2003). USEPA Region 5 ESLs.

        - LANL (2017). LANL NOEC ESLs.
    - If no direct contact ESV was available from the sources above, soil and sediment ESVs were modeled for non-ionic, organic compounds using the adapted biotic ligand models from USEPA (2018).
    - If no direct contact ESV was available from the sources above, surface water/pore water ESVs were selected as the minimum chronic value derived by the USEPA's ECOSAR Predictive Model (USEPA, 2017).
- Wildlife
    - For terrestrial receptors, USEPA (2008b), USEPA (2018), USEPA (2003), and LANL (2017) were used to select soil ESVs specific to birds and mammals. These ESVs were used in conjunction with the direct contact values identified above. An exceedance of a wildlife-based ESV was used to determine COIs for food chain-based, dose rate models (DRMs).
    - For aquatic receptors, USEPA (2006) and LANL (2017) were used to select sediment and water ESVs specific to birds and mammals. If no wildlife-based ESVs were available, the direct contact ESV was retained if the COI was identified as an important, bioaccumulative compound within USEPA (2000).

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# 3. Step 2: Screening Level Exposure Estimate and Risk Calculation

This section describes the methodology used to conduct screening-level exposure estimates and risk calculations for selected receptor categories, consistent with Step 2 of ERAGS (USEPA, 1997). This phase of the ERA uses the results of the screening-level problem formulation and ecological effects evaluation in Step 1 to estimate exposure and characterize risk. This section:

- Identifies exposure areas
- Describes the data used to characterize ecological exposure
- Presents the screening level exposure estimates
- Describes the screening level calculation and risk characterization process
- Specifies the criteria for COPEC selection and
- Presents the SMDP

## 3.1 Exposure Areas

An exposure area consists of a location within which an exposed ecological receptor can reasonably be assumed to move about and where contact with an environmental medium is equally possible at all points within the exposure area. For terrestrial exposure, all soil AOCs were each treated as separate exposure areas since the range of some ecological receptors are well within the size of each AOC. For aquatic and semi-aquatic exposure, the downgradient estuarine habitat was separated from the upgradient sediment samples located within a drainage channel (referred to as “Downgradient Estuarine” and “Upgradient Drainage” within this ERA, respectively). **Figure 2-1** identifies the exposure areas considered in the ERA.

## 3.2 Data Used to Characterize Ecological Exposure

The following data was used within each exposure area to estimate potential for adverse impacts to ecological receptors:

- Northern AOC
    - Four (4) surface soil samples
- Western AOC
    - Four (4) surface soil samples
- Central AOC
    - Nine (9) surface soil samples
- Southern AOC
    - Fourteen (14) surface soil samples
- Upgradient Drainage

    - Two (2) sediment samples
- Downgradient Estuarine
    - Nineteen (19) sediment samples
    - Seven (7) surface water samples
    - Eleven (11) pore water samples

For three groups of COIs (PAHs, DDD/DDE/DDT, and dioxins/furans), summations were used to evaluate ecological exposure in various media. These summations include total high and low molecular weight PAHs (soil), total PAHs (sediment, surface water, pore water), total DDD/DDE/DDT (all media), and total dioxins/furans using a relative toxicity equivalence quotient (TEQ) for birds, fish, and mammals (USEPA, 2008c). The Kaplan Meier method was used when non-detect data were present per USEPA (2016b) guidance.

## 3.3 Screening Level Exposure Estimate and Methodology

The preliminary exposure estimate presents the most conservative exposure scenario based on the most conservative exposure assumptions. Maximum concentrations were used to evaluate exposure. This approach addresses wildlife with small home ranges and sedentary organisms, e.g., soil or benthic macroinvertebrates.

- Direct Contact Evaluation
    - For terrestrial exposure, maximum COI concentrations in surface soil were compared to conservative ESVs known to be protective of soil macroinvertebrates and plants.
    - For aquatic and semi-aquatic exposure, maximum COI concentrations in sediment, surface water, and pore water were compared to conservative ESVs known to be protective of benthic macroinvertebrates, fish, and general aquatic community organisms.
    - COIs which were completely non-detect were screened using their maximum limits of quantitation (LOQs). COPECs based on LOQs will be reviewed during BERA Step 3a.
- Preliminary Wildlife Screening
    - For both avian and mammalian terrestrial receptors, maximum detected COI concentrations in surface soil were compared to ESVs protective of wildlife. Exceedances of ESVs protective of wildlife require additional DRMs to estimate the potential risk for each wildlife receptor.
    - For both avian and mammalian aquatic/semi-aquatic receptors, maximum detected COI concentrations in sediment and surface water were compared to ESVs protective of wildlife. Exceedances of ESVs protective of wildlife require additional DRMs to estimate the potential risk for each wildlife receptor.
    - COIs which were completely non-detect were not screened against wildlife-based ESVs or retained for DRMs. Uncertainties related to modeling of non-

detect data above wildlife ESVs will be discussed within **Section 5 Uncertainty Analysis**.

- Dose Rate Modeling
    - A DRM was used to generate a total estimated daily dose ($EDD_{total}$) of each COI experienced by each selected receptor. $EDD_{total}$ was compared against a TRV to assess the potential for ecological risk. $EDD_{total}$ consists of the sum of doses obtained from diet ($EDD_{diet}$) and the incidental ingestion of the substrate, i.e., soil or sediment ($EDD_{substrate}$). The contribution of surface water was considered negligible only for terrestrial receptors with prey items consisting of each receptors' primary source of dietary water.
    - Dietary composition for wildlife receptors was assumed to consist of 100% of the most contaminated prey item. Wildlife DRMs based on maximum detected COI concentrations assumed an area use factor (AUF) of 100%; this represents the worst-case exposure scenario for wildlife and assumes that receptors continuously forage at the maximum detected COI concentration.
    - $EDD_{total}$ for each constituent was compared to conservative TRVs for that constituent. TRVs constitute threshold effects concentrations derived from published toxicity test data. Two TRVs were used including the NOAEL and the Lowest Observed Adverse Effect Level (LOAEL). The NOAEL and LOAEL are daily dose levels normalized to the body weight of the test animals, e.g., milligrams of chemical per kilogram of body weight per day (mg/kg, bw-day).
        - Within a single study and endpoint (e.g., growth or reproduction), the NOAEL represents the highest tested concentration that did not result in the adverse effect, and the LOAEL represents the lowest tested concentration that did result in the adverse effect. Of these TRVs, the NOAEL is the conservative estimate of a safe exposure level, and the LOAEL is a more realistic estimate of exposures that may pose a risk to the receptor.
    - Additional details of DRMs and wildlife TRVs used in the ERA are presented in **Attachment B**.

## 3.4 Screening Level Risk Calculations and Risk Characterization

Potential risks associated with the ecological exposure estimates are expressed as a hazard quotient (HQ), which represents the ratio of the exposure point concentration (EPC) to the ESV for direct contact pathways or the calculated EDD to the TRV for wildlife ingestion pathways. As previously stated, the maximum detection or LOQ (for non-detected COIs) was used as the EPC during Step 2.

Based on the magnitude of the HQs, potential risks may be interpreted as follows:

- A HQ less than 1 based on a NOEC or NOAEL indicates that potential risk is not expected because the estimated exposure has not been demonstrated to cause adverse ecological effects (USEPA, 1997) and

- A HQ greater than or equal to 1 based on a NOEC or NOAEL indicates some potential for risk and further refinements should be made to reduce uncertainty.

This decision criterion reflects the abundance of caution adopted for the ERA evaluation. LOAEL-based TRVs are provided in **Attachment B** for reference in SLERA Step 2 but are not used for interpreting risk characterization results until BERA Step 3a.

The preliminary exposure estimate results for all receptors are summarized below. **Table 3-1** and **Table 3-2** present the direct contact evaluation and preliminary wildlife screening of surface soil and sediment/surface water/pore water, respectively. **Table 3-3** summarizes the DRM results for surface soil and sediment/surface water COIs exceeding wildlife screening values for all relevant receptors. Full DRM results, explanation of model parameters, and wildlife TRVs can be found in **Attachment B.**

Based on the evaluation of COI concentrations in relevant media, the following COPECs were identified at WFF (*italics indicate COPEC was 100% non-detect*):

- Northern AOC
    - Direct Contact (soil): chromium, thallium, *selenium*
    - Wildlife (soil): bis(2-ethylhexyl)phthalate, vanadium
- Western AOC
    - Direct Contact (soil): chromium, mercury, thallium, *selenium*
    - Wildlife (soil): bis(2-ethylhexyl)phthalate, vanadium
- Central AOC
    - Direct Contact (soil): benzaldehyde, Total HMW PAHs, chromium, cobalt, lead, manganese, mercury, nickel, selenium, thallium, zinc, *atrazine*
    - Wildlife (soil): bis(2-ethylhexyl)phthalate, Total HMW PAHs, Total DDD/DDE/DDT, chromium, lead, nickel, selenium, vanadium, zinc
- Southern AOC
    - Direct Contact (soil): alpha-chlordane, gamma-chlordane, barium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, thallium, zinc, *atrazine*
    - Wildlife (soil): bis(2-ethylhexyl)phthalate, Total DDD/DDE/DDT, Total TEQ (bird), Total TEQ (mammal), antimony, cadmium, chromium, copper, lead, nickel, selenium, silver, vanadium, zinc
- Qualitative evaluation of aluminum and iron in soil
    - Per USEPA (2008b) guidance, the potential adverse ecological effects for aluminum and iron are directly related to bioavailability and indirectly evaluated through pH levels in soil. Aluminum is only considered a soil COPEC when pH is less than 5.5 and iron is only considered a COPEC when pH is outside 5-8 and soil contains flocculent that may enhance potential toxicity of other metals (USEPA, 2008b).

  - As presented in **Section 2.1.1**, Molena loamy sand is the predominant soil type found with each soil AOC (>98%). Laboratory measurements using the 1:1 water method suggest a pH rating of 5.5 – as obtained from NRCS (2020).
  - Aluminum and iron will not be retained as COPECs for any soil AOC at WFF.

- Upgradient Drainage
  - Direct Contact (sediment): carbon disulfide, Total DDD/DDE/DDT, antimony, arsenic, barium, cadmium, copper, iron, lead, mercury, nickel, silver, zinc, *toxaphene, cyanide*
  - Wildlife (sediment): Total DDD/DDE/DDT, lead, vanadium
- Downgradient Estuarine
  - Direct Contact (sediment): acetone, carbon disulfide, bis(2-ehylhexyl)phthalate, di-n-octyl phthalate, Total TEQ (fish), aluminum, arsenic, barium, chromium, copper, iron, lead, nickel, selenium, *4-chloroaniline, toxaphene, cyanide, antimony*
  - Direct Contact (surface water): aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, mercury, potassium, selenium, *1,1,2-trichlorotrifluoroethane, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, chloroethane, chloromethane, cis-1,3-dichloropropane, dichlorodifluoromethane, methyl acetate, trans-1,3-dichloropropene, trichlorofluoromethane, 2-chloronaphthalene, 4,6-dinitro-o-cresol, 4-bromophenyl phenyl ether, 4-chloro-3-methyl phenol, 4-chlorophenyl phenyl ether, acetophenone, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, caprolactam, hexachlorobenzene, hexachlorocyclopentadiene, n-nitroso-di-n-propylamine, pentachlorophenol, alpha-chlordane, heptachlor, toxaphene, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260, cyanide, cadmium, silver, thallium*
  - Direct Contact (pore water): arsenic, barium, cadmium, calcium, chromium, magnesium, manganese, mercury, potassium, sodium, *1,1,2-trichlorotrifluoroethane, 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, 1,2-dichlorobenzene, chloroethane, chloromethane, cis-1,3-dichloropropane, dichlorodifluoromethane, hexachlorobutadiene, methyl acetate, trans-1,3-dichloropropene, trichlorofluoromethane, 2-chloronaphthalene, 4,6-dinitro-o-cresol, 4-bromophenyl phenyl ether, 4-chlorophenyl phenyl ether, acetophenone, bis(2-chloroethoxy)methane, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, caprolactam, di-n-butyl phthalate, hexachlorobenzene, hexachlorocyclopentadiene, n-nitroso-di-n-propylamine, pentachlorophenol, aluminum, antimony, cobalt, copper, lead, selenium, silver, thallium*
  - Wildlife (sediment and surface water): bis(2-ehylhexyl)phthalate, Total TEQ (bird), Total TEQ (mammal), aluminum, chromium, selenium, vanadium

## 3.5 Scientific Management Decision Point

The SMDP is a determination made at the culmination of the ERA process that states whether there is sufficient information to make a decision regarding risk management strategies (USEPA, 1997). The SMDP rendered at the end of the preliminary risk calculation does not set a clean-up goal. As stated in USEPA (1997), one of the following conclusions is reached after Step 2:

- There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk;
- The information is not adequate to a make a decision at this point and the ecological risk assessment will continue to Step 3; or
- The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

Based on the results of the direct contact evaluation and wildlife DRMs, the following SMDPs have been reached:

- The information is not adequate to a make a decision at this point and the ecological risk assessment continued to Step 3.
    - All Soil AOCs
        - Surface Soil – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for soil macroinvertebrates and wildlife.
    - Upgradient Drainage
        - Sediment – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for benthic macroinvertebrates and wildlife.
    - Downgradient Estuarine
        - Sediment/Surface Water/Pore Water – results of the direct contact evaluation and wildlife DRMs have indicated potential adverse effects for benthic macroinvertebrates and wildlife.

# 4. Step 3a: Constituents of Potential Ecological Concern Refinement

SLERA Steps 1 and 2 were used to select COPECs and evaluate ecological risk under a conservative, “worst-case” scenario. SLERA Steps 1 and 2 were also used to identify which constituents can be eliminated from further consideration and those that should be evaluated further. Because of the conservative assumptions used during SLERA Steps 1 and 2, some of the COPECs retained for BERA Step 3a COPEC refinement might pose negligible risk.

Step 3a represents a sub-tier of Step 3 within ERAGS and is designed to refine the list of COPECs by considering additional factors. By conducting a refined exposure evaluation, Step 3a can reduce the list of COPECs and determine if there are COPECs that truly warrant further evaluation with a BERA and/or remediation. Furthermore, Step 3a can focus on the potential risk drivers and exposure areas where the likelihood of adverse ecological effects is greatest.

## 4.1 Step 3a COPEC Refinement Approach

The BERA Step 3a refinements discussed within these subsections below include:

- Elimination of COPECs based on detection frequency and spatial distribution;
- Calculation and selection of refined EPCs;
- Refined direct contact evaluation for soil and benthic macroinvertebrates; and
- Refinement of DRMs for birds and mammals.

**Table 4-1** summarizes the detected COPECs carried forward into Step 3a for each medium and exposure area (see **Section 4.1.1** for COPECs based on LOQs).

### 4.1.1 Frequency, Magnitude, and Spatial Distribution of Detected Chemicals

COPECs identified in SLERA Step 2 were considered for exclusion from the BERA Step 3a evaluation if the following criteria were met:

- The COPEC was detected infrequently in one or two media types (less than 5% of samples) and
- The COPEC was not detected in any other sample medium.

Due to the varied history of each exposure area, multiple lines of evidence will be considered for each COPEC in consideration for exclusion. Any deviation from the above points will be discussed briefly below and considered in the uncertainty analysis for this evaluation. **Table 4-2** summarizes the COPECs removed from the Step 3a refined evaluation (the full RI/SFI data set is included within AECOM [2022]).

### 4.1.2 Refinement of Exposure Point Concentrations

The upper confidence limit (UCL) of the mean was used as a refined EPC for COPECs with at least eight (8) samples and two (2) distinct detects. The UCLs were calculated with ProUCL 5.1 (USEPA, 2016b). The ProUCL 5.1 output reports are included within **Attachment C**.

### 4.1.3 Refined Direct Contact Evaluations

The refined EPCs of direct contact COPECs, not excluded in **Table 4-2**, were compared to their respective refined ESVs to identify Step 3a COPECs. Selected refined ESVs and the refined direct contact evaluations are presented in **Attachment D**. The hierarchy used to identify refined screening benchmarks is presented below for each medium.

- Surface soil
    - USEPA (2008b) Eco-SSLs reported for soil macroinvertebrates
        - The geometric mean of eligible toxicity values protective of growth and reproduction; in cases where a geometric mean could not be calculated, the minimum eligible toxicity value was used as a refined ESV.
    - USEPA (2018) Region 4 ESVs reported for soil macroinvertebrates
        - If this value was based on a NOEC value, the LOEC value from LANL (2017) was used instead if applicable.
    - LANL (2017) LOEC soil ESLs protective of soil macroinvertebrates
    - If no soil macroinvertebrate ESVs were available, terrestrial plant ESVs were selected if applicable.
- Sediment
    - USEPA (2018) Region 4 Refined ESVs reported for sediment
    - LANL (2017) LOEC sediment ESLs protective of aquatic community organisms
- Surface water and pore water
    - USEPA (2018) Region 4 Refined ESVs reported for surface water
    - LANL (2017) LOEC water ESLs protective of aquatic community organisms

### 4.1.4 Refined Wildlife Dose Rate Models

Within SLERA Step 2, an abundance of caution was used when modeling food chain exposure via wildlife DRMs. Refined Step 3a receptor profiles, bioaccumulation models, and wildlife DRMs are provided in **Attachment E**. NOAEL and LOAEL TRVs presented in **Attachment B** with the Step 2 DRMs are still applicable for the refined Step 3a DRMs.

The following elements of the wildlife DRMs were refined to provide more representative estimates of potential hazard to avian and mammalian receptors:

- Refined EPC
    - The UCL of the mean was used as a refined EPC for COPECs with at least eight (8) samples and two (2) distinct detects. The UCLs were calculated with ProUCL 5.1 (USEPA, 2016b). Tables summarizing statistics and refined EPC selection for each site/medium and the ProUCL output reports are included with **Attachment C**.
- Refined dietary composition

    - Dietary components were adjusted to reflect representative dietary components (if applicable). These adjustments were made based on mean composition provided in either USEPA (1993) or Sample and Suter (1994).

- LOAEL-based TRVs
    - During the selection of wildlife TRVs within the SLERA, preference was given to the most conservative NOAEL TRV. NOAEL-based TRVs were used to protect wildlife species at the individual level. This may be appropriate to protect T&E species where the loss of one individual may have an adverse effect on the survival of the population. However, the conservative use of NOAEL-based TRVs may overestimate risk to populations of non-endangered species.
    - For BERA Step 3a, refinements were made to include a LOAEL TRV based on representative effects, primarily growth and reproduction. LOAEL TRVs represent the lowest observed concentration at which measurable effects within an endpoint (i.e., growth or reproduction) would be expected for an individual receptor. LOAEL–based TRVs were used in Step 3a, in conjunction with the NOAEL-based TRVs, to establish a range of risk for ecological resources for consideration by risk managers in making risk management decisions.

## 4.2 Refined Risk Calculations and Risk Characterization

The refined exposure estimates represent a more realistic exposure scenario based on the comparisons of refined EPCs to refined direct contact ESVs, DRM assumptions, and TRVs. A refined characterization of potential risks is presented in the sections below based on these exposure assumptions to focus the list of COPECs and exposure pathways that may warrant further evaluation. Summaries of the refined direct contact evaluations (**Table 4-3 and Table 4-4**) and refined DRMs (**Table 4-5**) are provided below.

Based on the evaluation of refined COPEC concentrations in relevant media, the following refined COPECs (i.e., refined or LOAEL HQ > 1) were identified at WFF (*italics indicate COPEC was 100% non-detect*):

- Northern AOC
    - Direct Contact (soil): no refined COPECs retained during Step 3a
    - Wildlife (soil): no refined COPECs retained during Step 3a
- Western AOC
    - Direct Contact (soil): no refined COPECs retained during Step 3a
    - Wildlife (soil): no refined COPECs retained during Step 3a
- Central AOC
    - Direct Contact (soil): nickel
    - Wildlife (soil): nickel

- Southern AOC
    - Direct Contact (soil): barium, chromium, copper, manganese, mercury, zinc
    - Wildlife (soil): Total DDD/DDE/DDT, Total TEQ (Mammal)
- Upgradient Drainage
    - Direct Contact (sediment): Total DDD/DDE/DDT
    - Wildlife (sediment): no refined COPECs retained during Step 3a
- Downgradient Estuarine
    - Direct Contact (sediment): bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, Total TEQ (Fish)
    - Direct Contact (surface water): *silver*
    - Direct Contact (pore water): sodium, *aluminum, antimony, cobalt, copper, lead, selenium, silver, thallium*
    - Wildlife (sediment and surface water): bis(2-ethylhexyl)phthalate, aluminum

## 4.3 Step 3a COPEC Refinement Summary

Based on the results of the refined direct contact evaluation and refined wildlife DRMs, the following BERA Step 3a conclusions have been reached:

- Northern AOC
    - No refined COPECs were retained within the refined direct contact evaluation and wildlife DRMs (all LOEC/LOAEL HQs < 1).
- Western AOC
    - No refined COPECs were retained within the refined direct contact evaluation and wildlife DRMs (all LOEC/LOAEL HQs < 1).
- Central AOC
    - The refined wildlife DRMs indicated that nickel should be retained as a refined COPEC due to LOAEL HQs = 2 and 8 for the American robin and short-tailed shrew, respectively. Nickel was the only COPEC with a refined HQ > 1 within the refined direct contact evaluation (HQ = 2).
- Southern AOC
    - Multiple metals (barium, chromium, copper, manganese, mercury, and zinc) identified during refined direct contact evaluation with refined HQs > 1. Additionally, Total DDD/DDE/DDT and Total TEQ (Mammal) had refined LOAEL HQs > 1 for the red-tailed hawk and short-tailed shrew respectively.
- Upgradient Drainage
    - Of the limited sediment samples (n = 2), only Total DDD/DDE/DDT had a refined HQ > 1. Total DDD/DDE/DDT is non-detect in downgradient sample

locations. Adverse effects of sediment transport to the downgradient environment via the upgradient drainage channel is unlikely (soil AOCs are most likely source).

- These detections in the upgradient area may be related to historical maintenance activities where spraying of pesticides would have occurred along perimeter of cleared areas to control growth.

- Downgradient Estuarine
  - Due to elevated LOQs and no information on sample dilution, several metals have elevated refined HQs within the refined direct contact evaluation for pore water. However, concentrations of these metals within surface water indicate that refined HQs do not exceed 1 for any detected metal. The only detected COPEC with a refined HQ > 1 is sodium (HQ = 2). The adverse impacts of elevated sodium within an estuarine – marine environment are expected to be negligible, if present at all, for direct contact exposure.
  - Both the refined direct contact evaluation and wildlife DRMs have indicated potential impacts to sediment that may adversely impact aquatic/semi-aquatic ecological receptors. Refined and LOAEL HQs for bis(2-ethylhexyl)phthalate were 48 and 11/40 (osprey/marsh wren), respectively. Di-n-octyl phthalate and Total TEQ (Fish) had elevated refined HQs above 1. Within the refined wildlife DRMs, aluminum had LOAEL HQs from 5 to 51; however, there is considerable uncertainty on the accuracy of the estimated prey concentrations (no available models, so tissue concentrations were assumed equal to sediment).
  - Although no breeding populations have been noted, the downgradient estuarine marsh and wetlands could provide potential habitat for the eastern black rail (Virginia state endangered species). Detections of the eastern black rail have been restricted to bayside, Accomack County – thus, suggesting that there is a potential for occurrence and LOAEL TRVs may not be protective enough.

The results of the Step 3a COPEC Refinement (presented above) will be used with the Uncertainty Analysis (see **Section 5**) to reach a final SMDP. The final SMDP and further recommendations (if applicable) will be presented in **Section 6**.

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# 5. Uncertainty Analysis

An uncertainty analysis was performed to identify assumptions and procedures that may result in uncertainty in the estimation of exposure or the characterization of risk. Uncertainty in the ERA is assessed with respect to the following:

- Effects and exposure assessment and
- Risk characterization.

Assumptions and other factors that tend to overestimate, underestimate, or have an unknown effect on the findings of the primary phases of the ERA are presented and discussed in the following sections.

## 5.1 Exposure and Effects Assessment

Sources of uncertainty associated with the effects and exposure assessment made in the ERA are listed below:

- Duplicate data
    - Magnitude – minimal (under/overestimate)
    - Rationale – during this evaluation, duplicate samples were kept as independent samples. Duplicate samples were not biased and collected randomly during both the RI and SFI. Any effects from retaining duplicates were expected to be minimal given the random approach for selecting duplicate locations (equal chance to under or overestimate risk). Duplicates were retained during Step 3a refinements to provide higher sample populations for sites and media with less data. Effect on UCL calculations would be negligible for larger sample populations.
- COI bioavailability
    - Magnitude – minimal (overestimate)
    - Rationale – chemical analyses measured the total levels of the constituents rather than the bioavailable toxic forms. By using total concentrations, this assessment assumes that the entire fraction is bioavailable and toxic. This is likely a very conservative assumption that varies in magnitude from constituent to constituent. It is also likely that, to some degree, constituents adsorb to fine-grained particles and/or complex with organic ligands. Such actions may change the chemical speciation of the constituent to a less toxic form or reduce the concentrations of bioavailable chemicals. Hence, the use of the total concentrations to estimate exposure does not take into account these changes in speciation or reductions in toxicity and, therefore, likely overestimates risk when compared to toxicological benchmarks derived from more bioavailable and toxic forms.
- Selection of ESVs
    - Magnitude – minimal (overestimate)

    - Rationale – ESVs presented in SLERA Step 2 are selected to identify conditions that are not expected to lead to adverse ecological harm so that COIs can be eliminated from further evaluation due to a lack of potential risks. Therefore, the screening benchmarks are highly conservative (to avoid eliminating a COI that may cause a risk), do not reflect Site-specific conditions, and cannot account for potentially antagonistic or synergistic effects between different compounds. Refinements made during BERA Step 3a were used to minimize uncertainty generated during SLERA Step 2 screening by using LOEC- and LOAEL-based benchmarks when available.

- Qualitative evaluation of aluminum and iron in soil
    - Magnitude – unknown (underestimate)
    - Rationale – per USEPA (2008b) guidance, the potential adverse ecological effects for aluminum and iron are directly related to bioavailability and indirectly evaluated through pH levels in soil. Ultimately, ecological risk for these constituents in soil is not quantifiable using the HQ method outlined in USEPA (1997). The impact of excluding aluminum and iron as COPECs is expected to be minimal.

## 5.2 Risk Characterization

Sources of uncertainty associated with the risk characterization made in the ERA are listed below:

- Synergistic and antagonistic effects
    - Magnitude – minimal (under/overestimate)
    - Rationale – exposures to ecological receptors involve more than one type of contaminant. This raises the possibility that synergistic or antagonistic interactions might occur. However, data are generally not adequate to permit any quantitative adjustment in toxicity values or risk calculations based on interactions between different compounds. If any of the COPECs act by a similar mode of action, total risks could have been higher than estimated. Conversely, if the COPECs act antagonistically, total risks could have been lower than estimated.
- Application of hazard quotients
    - Magnitude – minimal (overestimate)
    - Rationale – the application of hazard quotients to quantify potential ecological risk has certain limitations although the USEPA recommends this approach for the screening-level risk calculation. One of the advantages is that the procedure intentionally overestimates risks to “ensure that potential ecological threats are not overlooked” (USEPA, 1997). However, the HQ method does limit the information obtained because it provides only a single point of comparison for the exposure-response relationship.
- Single-species endpoints

    - Magnitude – unknown (under/overestimate)
    - Rationale – single-species, single-contaminant laboratory studies are used to estimate ecological effects at the population level. The risk assessment used toxicological data that were collected on an individual basis, not on a population level. Therefore, the HQs represent potential risk to a single individual organism, not to a population or community. This potential risk is extrapolated to include the entire population as a whole.

- Incomplete characterization
    - Magnitude – minimal (under/overestimate)
    - Rationale – given the use of conservative assumptions regarding exposure and potential toxicological effects, there is minimal uncertainty that the potential ecological risks towards ecological receptors from Site-related constituents went undetected in the ERA process.

## 5.3 Summary of Uncertainty

In general, conservative estimates or assumptions were made for most parameters associated with ecological exposures and effects in SLERA Steps 1 and 2. More realistic refinements were made during BERA Step 3a COPEC refinement to reduce uncertainties in the final conclusions. Therefore, confidence is high that the conclusions regarding the potential for adverse ecological harm are adequately conservative to quantify potential risks to soil macroinvertebrates, benthic macroinvertebrates, birds, and mammals.

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# 6. Conclusions and SMDP Recommendation

The overall objective of this ERA was to determine whether potentially adverse ecological effects are occurring, or may occur, due to Site-related constituents in relevant media. Potential for risks were evaluated by screening in a SLERA framework that identified a limited number of COPECs. The evaluations for these COPECs were further refined in the context of BERA Step 3a of the ERAGS.

The results of the SLERA, BERA Step 3a COPEC refinement, and the consideration of the uncertainties present in the evaluation support the following conclusions:

- “There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risk” (USEPA, 1997)
    - Northern AOC: soil macroinvertebrates and terrestrial wildlife
    - Western AOC: soil macroinvertebrates and terrestrial wildlife
    - Upgradient Drainage: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
- The information indicates a potential for adverse ecological effects
    - Central AOC: soil macroinvertebrates and terrestrial wildlife
    - Southern AOC: soil macroinvertebrates and terrestrial wildlife
    - Downgradient Estuarine: benthic macroinvertebrates and aquatic/semi-aquatic wildlife
        - Impacts to sediment greatest within exposure area – adverse population-level effects to ecological receptors via surface water and pore water are unlikely.

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# Figures

OHIO
PENNSYLVANIA
Project 15 CDL
WEST VIRGINIA
KENTUCKY
VIRGINIA
TENNESSEE
NORTH CAROLINA
1 inch = 240 miles
Chincoteague Bay
Little Mosquito Creek
Wattsville Branch
Simoneaston Bay
Shelly Bay
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
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Site Location
Project 15 CDL FS
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Figure 1-1
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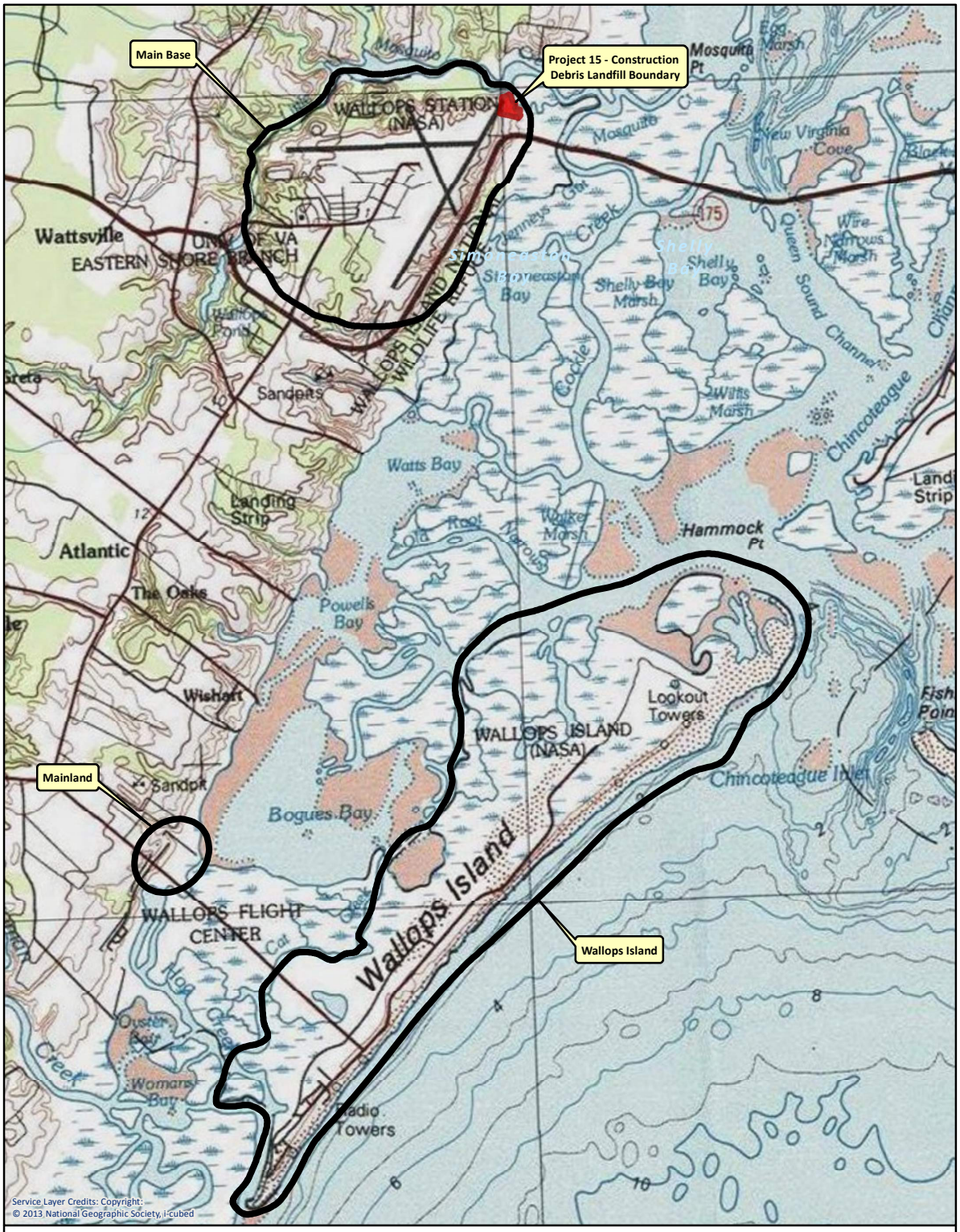
Main Base
Project 15 - Construction Debris Landfill Boundary
Mainland
Wallops Island
WALLOPS STATION (NASA)
WALLOPS FLIGHT CENTER
WALLOPS ISLAND (NASA)
Wattsville
EASTERN SHORE BRANCH
Atlantic
The Oaks
Wishart
Sandpit
Landing Strip
Watts Bay
Powells Bay
Bogues Bay
Hammock Pt
Lookout Towers
Radio Towers
Chincoteague Inlet
Chincoteague
Shelly Bay
Shelly Bay Marsh
Wills Marsh
Queen Sound Channel
Mosquito Pt
New Virginia Cove
Egg Marsh
Wire Narrows Marsh
Simonetastic Bay
Cockle Creek
Old Root Narrows
Walker Marsh
Womans Bay
Oyster Bay
Service Layer Credits: Copyright:
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Site Layout
Project 15 CDL FS
WFF FUDS
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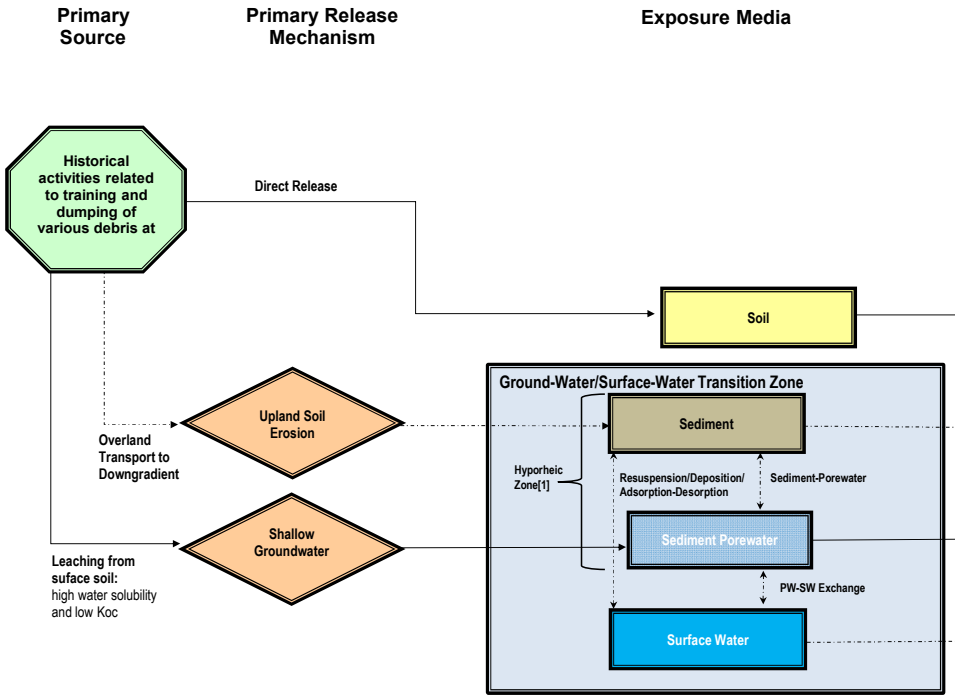


| Exposure Routes | Soil Macroinvertebrates | Benthic Macroinvertebrates | Avian/Mammalian Carnivores and Piscivores | Avian/Mammalian Invertivore | Avian/Mammalian Herbivore |
|---|---|---|---|---|---|
| Direct Contact/Absorption | ● | ☒ | ☐ | ☐ | ☐ |
| Direct Ingestion | ● | ☒ | ☒ | ☒ | ☒ |
| Incidental Ingestion | -- | ☒ | ● | ● | ● |
| Prey and Plant Dietary Items | -- | ☒ | ● | ● | ● |
| Direct Contact/Absorption | ☒ | ● | ☐ | ☐ | ☐ |
| Direct Ingestion | ☒ | ● | ☒ | ☒ | ☒ |
| Incidental Ingestion | -- | -- | ● | ● | ● |
| Prey Items | -- | -- | ● | ● | ● |
| Direct Contact/Absorption | ☒ | ● | ☒ | ☒ | ☒ |
| Direct Ingestion | ☒ | ● | ☒ | ☒ | ☒ |
| Incidental Ingestion | -- | -- | ☒ | ☒ | ☒ |
| Prey Items | -- | -- | ☒ | ☒ | ☒ |
| Direct Contact/Absorption | ☒ | ● | ☐ | ☐ | ☐ |
| Direct Ingestion | ☒ | ● | ● | ● | ● |
| Incidental Ingestion | -- | -- | ● | ● | ● |
| Prey Items | -- | -- | ☐ | ☐ | ☐ |

**NOTES:**
[1] The hyporheic zone is defined as a "latticework of underground habitats through the sediments associated with the interstitial waters in the substrate beneath and adjacent to moving surface-waters" (USEPA, 2008).

**REFERENCES:**
USEPA. 2008. ECO Update/Ground Water Forum Issue Paper: Evaluating Ground-Water/Surface-Water Transition Zones in Ecological Risk Assessments. Publication 9285.6-17 EPA-540-R-06-072. July 2008.

**LEGEND:**

| | |
|---|---|
| → | CONTAMINANT MIGRATION PATHWAY |
| ⇢ | POTENTIAL CONTAMINANT MIGRATION PATHWAY |
| ● | POTENTIAL COMPLETE PRIMARY EXPOSURE PATHWAY |
| ☐ | EXPOSURE PATHWAY IS COMPLETE OR POTENTIALLY COMPLETE AND INSIGNIFICANT |
| -- | SIGNIFICANCE OF EXPOSURE PATHWAY IS UNCERTAIN |
| ☒ | INCOMPLETE EXPOSURE PATHWAY |

**Figure 2-2**
**Ecological Conceptual Site Model**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

# Tables

## Table ES-1. SLERA Step 2 Detected COPECs

| COPEC | Terrestrial | | | | Aquatic/Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|
| | N | W | C | S | $U_{SD}$ | $D_{SD}$ | $D_{SW}$ | $D_{PW}$ |
| **Volatile Organic Compounds** | | | | | | | | |
| Acetone | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Carbon disulfide | ○ | ○ | ○ | ○ | ● | ● | ○ | ● |
| **Semi-Volatile Organic Compounds** | | | | | | | | |
| Benzaldehyde | – | – | ● | ○ | – | ○ | – | ○ |
| bis(2-Ethylhexyl)phthalate | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Di-n-octyl phthalate | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Total HMW PAHs | ○ | ○ | ● | ○ | – | – | – | – |
| **Pesticides** | | | | | | | | |
| alpha-Chlordane | ○ | ○ | ○ | ● | ○ | ○ | LOQ | – |
| gamma-Chlordane | ○ | ○ | ○ | ● | ○ | ○ | ○ | – |
| Total DDD/DDE/DDT | ○ | ○ | ○ | ○ | ● | ○ | ○ | – |
| **Dioxins and Furans** | | | | | | | | |
| Total TEQ (Bird) | – | – | – | ○ | – | ○ | – | ○ |
| Total TEQ (Fish) | – | – | – | – | – | ● | – | ○ |
| Total TEQ (Mammal) | – | – | – | ○ | – | ○ | – | ○ |
| **Total Metals** | | | | | | | | |
| Aluminum | ○ | ○ | ○ | ○ | ○ | ● | ● | LOQ |
| Antimony | ○ | ○ | ○ | ○ | ● | LOQ | ○ | LOQ |
| Arsenic | ○ | ○ | ○ | ○ | ● | ● | ● | ● |
| Barium | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| Cadmium | ○ | ○ | ○ | ○ | ● | ○ | LOQ | ● |
| Calcium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Chromium | ● | ● | ● | ● | ○ | ● | ● | ● |
| Cobalt | ○ | ○ | ● | ● | ○ | ○ | ○ | LOQ |
| Copper | ○ | ○ | ○ | ● | ● | ● | ● | LOQ |
| Iron | ○ | ○ | ○ | ○ | ● | ● | ● | ○ |
| Lead | ○ | ○ | ● | ● | ● | ● | ● | LOQ |
| Magnesium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Manganese | ○ | ○ | ● | ● | ○ | ○ | ○ | ● |
| Mercury | ○ | ● | ● | ● | ● | ○ | ● | ● |
| Nickel | ○ | ○ | ● | ● | ● | ● | ○ | ○ |
| Potassium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Selenium | LOQ | LOQ | ● | ● | ○ | ● | ● | LOQ |
| Silver | ○ | ○ | ○ | ○ | ● | ○ | LOQ | LOQ |
| Sodium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Thallium | ● | ● | ● | ● | ○ | ○ | LOQ | LOQ |
| Vanadium | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Zinc | ○ | ○ | ● | ● | ● | ○ | ○ | ○ |

**Notes**: COPEC = Constituent of Potential Ecological Concern; N = Northern AOC; W = Western AOC; C = Central AOC; S = Southern AOC; $U_{SD}$ = Upgradient Drainage Sediment; $D_{SD}$ = Downgradient Estuarine Sediment; $D_{SW}$ = Downgradient Estuarine Surface Water; $D_{PW}$ = Downgradient Estuarine Pore Water; ; **–** indicates that data was not evaluated/available for exposure area/medium; ○ indicates that data was evaluated for exposure area/medium, but COI not selected as a direct contact COPEC; ● indicates direct contact COPEC for exposure area/medium; yellow highlighting indicates wildlife COPEC for exposure area/medium; LOQ indicates that COPEC was all non-detect

## Table ES-2. Refined Direct Contact COPECs (Soil)

| COPEC | Surface Soil Refined Hazard Quotient (HQ) | | | |
|---|---|---|---|---|
| | Northern AOC | Western AOC | Central AOC | Southern AOC |
| **Semi-Volatile Organic Compounds** | | | | |
| Benzaldehyde | -- | -- | <1 | -- |
| Total HMW PAHs | -- | -- | **1** | -- |
| **Pesticides** | | | | |
| alpha-Chlordane | -- | -- | -- | <1 |
| gamma-Chlordane | -- | -- | -- | <1 |
| **Total Metals** | | | | |
| Barium | -- | -- | -- | **2** |
| Chromium | <1 | <1 | **1** | **4** |
| Cobalt | -- | -- | **1** | <1 |
| Copper | -- | -- | -- | **30** |
| Lead | -- | -- | <1 | <1 |
| Manganese | -- | -- | <1 | **2** |
| Mercury | -- | <1 | <1 | **2** |
| Nickel | -- | -- | **2** | <1 |
| Selenium | *<1* | *<1* | <1 | <1 |
| Thallium | <1 | <1 | <1 | <1 |
| Zinc | -- | -- | <1 | **11** |

**Notes:** Shading and italics indicate refined COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ); **Bold text** indicates the refined HQ for detected COPECs evaluated using their refined exposure point concentration; -- = Not a COPEC for Exposure Area/Medium; AOC = Area of Concern; COPEC = Chemical of Potential Ecological Concern; highlighting indicates refined HQ > 1

## Table ES-3. Refined Direct Contact COPECs
## (Sediment, Surface Water, and Pore Water)

| COPEC | Sediment Hazard Quotient (HQ) | | SW HQ | PW HQ |
|---|---|---|---|---|
| | Upgradient Drainage | Downgradient Estuarine | | |
| **Volatile Organic Compounds** | | | | |
| Acetone | -- | <1 | -- | -- |
| Carbon disulfide | <1 | <1 | -- | <1 |
| **Semi-Volatile Organic Compounds** | | | | |
| bis(2-Ethylhexyl)phthalate | -- | **48** | -- | -- |
| Di-n-octyl phthalate | -- | **3** | -- | -- |
| **Pesticides** | | | | |
| Total DDD/DDE/DDT | **5** | -- | -- | -- |
| **Dioxins and Furans** | | | | |
| Total TEQ (Fish) | -- | **3** | -- | -- |
| **Total Metals** | | | | |
| Aluminum | -- | <1 | **1** | *267* |
| Antimony | <1 | *<1* | -- | *83* |
| Arsenic | <1 | <1 | <1 | <1 |
| Barium | **1** | <1 | <1 | <1 |
| Cadmium | <1 | -- | *1* | **1** |
| Calcium | -- | -- | <1 | <1 |
| Chromium | -- | <1 | <1 | <1 |
| Cobalt | -- | -- | -- | 9 |
| Copper | <1 | <1 | **1** | *1,042* |
| Iron | <1 | <1 | <1 | -- |
| Lead | <1 | <1 | <1 | *299* |
| Magnesium | -- | -- | **1** | **1** |
| Manganese | -- | -- | -- | <1 |
| Mercury | <1 | -- | <1 | <1 |
| Nickel | <1 | <1 | -- | -- |
| Potassium | -- | -- | <1 | <1 |
| Selenium | -- | <1 | <1 | *850* |
| Silver | <1 | -- | *3* | *5,102* |
| Sodium | -- | -- | **1** | **2** |
| Thallium | -- | -- | *<1* | *463* |
| Zinc | <1 | -- | -- | -- |

**Notes:** Shading and italics indicate refined COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ); **Bold text** indicates the refined HQ for detected COPECs evaluated using their refined exposure point concentration; -- = Not a COPEC for Exposure Area/Medium; COPEC = Chemical of Potential Ecological Concern; PW = Pore Water; SW = Surface Water; highlighting indicates refined HQ > 1

## Table ES-4. Refined Wildlife Dose Rate Model COPECs

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| **Northern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Vanadium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Western AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | **1**/<1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Vanadium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Central AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Total HMW PAHs | <1 | **2**/<1 | <1 | **1**/<1 | **9**/<1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **1**/<1 | **8**/<1 | <1 | **4**/<1 | **5**/<1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Chromium | <1 | **1**/<1 | <1 | <1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Lead | <1 | **2**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Nickel | **1**/<1 | **6/2** | <1 | **4**/<1 | **34/8** | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **1**/<1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **<1** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Southern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | **1**/<1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **6**/<1 | **39/2** | <1 | **22**/<1 | **26**/<1 | -- | -- | -- | -- |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | <1 | **3**/<1 | <1 | -- | -- | -- | -- | -- | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | <1 | **57/6** | **4**/<1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Antimony | -- | -- | -- | **7**/<1 | **55/1** | **1**/<1 | -- | -- | -- | -- |
| Cadmium | <1 | <1 | <1 | <1 | **2**/<1 | <1 | -- | -- | -- | -- |
| Chromium | **1**/<1 | **4**/<1 | <1 | **2**/<1 | **4**/<1 | <1 | -- | -- | -- | -- |
| Copper | **5**/<1 | **11/1** | **3**/<1 | **5**/<1 | **3**/<1 | <1 | -- | -- | -- | -- |

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| Lead | **5**/<1 | **15**/<1 | **3**/<1 | **2**/<1 | **5**/<1 | <1 | -- | -- | -- | -- |
| Nickel | <1 | <1 | <1 | <1 | **4**/<1 | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **2**/<1 | **2**/<1 | <1 | -- | -- | -- | -- |
| Silver | <1 | **2**/<1 | <1 | <1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **2**/<1 | <1 | **1**/<1 | **2**/<1 | <1 | -- | -- | -- | -- |
| **Upgradient Drainage** | | | | | | | | | | |
| **Pesticides** | | | | | | | | | | |
| Total DDD/DDE/DDT | -- | -- | -- | -- | -- | -- | **4**/<1 | <1 | <1 | <1 |
| **Metals** | | | | | | | | | | |
| Lead | -- | -- | -- | -- | -- | -- | **1**/<1 | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **3**/<1 | <1 | <1 | <1 |
| **Downgradient Estuarine** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | -- | -- | **402/40** | **113/11** | **1**/<1 | **4**/<1 |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | -- | -- | -- | -- | -- | -- | <1 | <1 | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | -- | -- | -- | -- | -- | <1 | **2**/<1 |
| **Metals** | | | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | **52/5** | **14/1** | **170/17** | **514/51** |
| Chromium | -- | -- | -- | -- | -- | -- | **3**/<1 | <1 | <1 | <1 |
| Selenium | -- | -- | -- | -- | -- | -- | **3/1** | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **4/1** | <1 | <1 | <1 |

**Notes:** "**5/8**" indicates NOAEL/LOAEL HQs; "<1" indicates both NOAEL and LOAEL HQs are less than 1;

-- = Not a COPEC for Chemical/Exposure Area; AR = American Robin; COPEC = Chemical of Potential Ecological Concern; MK = Mink; MV = Meadow Vole; MW = Marsh Wren; NB = Northern Bobwhite; OS = Osprey; RC = Raccoon; RF = Red Fox; RH = Red-Tailed Hawk; SS = Short-Tailed Shrew; highlighting indicates LOAEL HQ > 1

## Table 2-1. Summary of Soil Types

| Soil Type | Percent of Area of Concern (AOC) | Description |
|---|---|---|
| **Northern AOC** | | |
| MoD | 97.8 | Molena loamy sand, 6 to 35 percent slopes – well drained to excessively drained sands or gravelly sands with a high rate of water transmission. Laboratory measurement pH rating of 5.5 using the 1:1 water method. (NRCS 2020). |
| BoA | 2.4 | Bojac fine sandy loam, 0 to 2 percent slopes – similar to above but with lower permeability and lower percentage of coarser sand. Laboratory measurement pH rating of 5.1 using the 1:1 water method. |
| **Central AOC** | | |
| MoD | 100 | See initial description above |
| **Southern AOC** | | |
| MoD | 100 | See initial description above |
| **Western AOC** | | |
| MoD | 100 | See initial description above |
| **Surrounding Wetland Area** | | |
| MaA | 95.0 | Magotgha fine sandy loam, 0 to 2 percent slopes – frequently flooded but not ponded and typically found in salt marshes on coastal plains. Poorly drained with water movement in the most restricted layer being moderately high. |
| ChA | 5.0 | Chincoteague silt loam, 0 to 1 percent slopes – similar to above but very frequently flooded. |

## Table 2-2. Review of Threatened and Endangered Wildlife Species

| Common Name | Scientific Name | Status | Potential to Occur at Main Base WFF? | Rationale |
|---|---|---|---|---|
| **Birds** | | | | |
| Piping Plover | *Charadrius melodus* | T | Unlikely | Nesting and breeding territory typically occur on sandy upper beaches where scattered grass tufts are present. Home range and foraging area during the breeding season generally is confined to the vicinity of the nest. |
| Wilson's Plover | *Charadrius wilsonia* | SE | Unlikely | Nests principally on sand or bare soil near salt or brackish water. In Virginia, nests on the upper portions of sandy beaches on barrier islands, usually within 30 meters of dune vegetation but not in dense vegetation. |
| Peregrine Falcon | *Falco peregrinus* | ST | Unlikely | Requires cliffs for nesting locations. When not breeding, occurs in areas including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports. |
| Gull-billed Tern | *Gelochelidon nilotica* | ST | Unlikely | Nesting sites confined to sandy barrier islands, beaches, sandy shores of saline lagoons and marshes, and artificially produced dredge spoil islands. |
| Black Rail | *Laterallus jamaicensis* | SE | **Yes** | Breeding areas include salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy "swamps". Detections within Maryland and Virginia only noted to bayside locations within Accomack County. |
| **Reptiles and Amphibians** | | | | |
| Loggerhead (Sea Turtle) | *Caretta caretta* | T | Unlikely | In Chesapeake Bay, occurs mainly in deeper channels, usually at river mouths or in the open bay. |
| **Invertebrates** | | | | |
| Northeastern Beach Tiger Beetle | *Cicindela dorsalis dorsalis* | T | Unlikely | All subspecies occur on seashores, including beaches of lower Chesapeake Bay. Requires sandy beaches and dunes for burrowing. |
| **Flora** | | | | |

| Common Name | Scientific Name | Status | Potential to Occur at Main Base WFF? | Rationale |
|---|---|---|---|---|
| Sea-beach amaranth | *Amaranthus pumilus* | T | Unlikely | This species occurs on barrier islands, mainly on coastal overwash flats at the accreting ends of the islands and lower foredunes and on ocean beaches above mean high tide. |

**Notes**: E = Endangered; T= Threatened (if not preceded by “S” or “F”, state and federal designation are the same)

## Table 2-3. Assessment and Measurement Endpoints

| Assessment Endpoint(s) | Measurement Endpoint |
|---|---|
| **Macroinvertebrate Community** | |
| Survival, growth, and reproduction of the soil macroinvertebrate community. | Comparison of COI concentrations in soil to ecotoxicity benchmarks for soil macroinvertebrates. |
| Survival, growth, and reproduction of the benthic macroinvertebrate community. | Comparison of COI concentrations in sediment and surface water/pore water to ecotoxicity benchmarks for benthic macroinvertebrates. |

| Assessment Endpoint(s) | Measurement Endpoint |
|---|---|
| **Avian Community** | |
| Survival, growth, and reproduction of the avian invertivore community. | Comparison of modeled daily doses to a toxicity reference value (TRV). |
| Survival, growth, and reproduction of the avian herbivore community. | |
| Survival, growth, and reproduction of the avian carnivore/piscivore community. | |
| **Mammalian Community** | |
| Survival, growth, and reproduction of the mammalian invertivore community. | Comparison of modeled daily doses to a TRV. |
| Survival, growth, and reproduction of the mammalian herbivore community. | |
| Survival, growth, and reproduction of the mammalian carnivore/piscivore community. | |

## Table 3-1. Direct Contact COPECs (Soil)

| COPEC | Surface Soil Hazard Quotient (HQ) | | | |
|---|---|---|---|---|
| | Northern AOC | Western AOC | Central AOC | Southern AOC |
| **Semi-Volatile Organic Compounds** | | | | |
| Atrazine | -- | -- | *4* | *4* |
| Benzaldehyde | -- | -- | **2** | -- |
| Total HMW PAHs | -- | -- | **1** | -- |
| **Pesticides** | | | | |
| alpha-Chlordane | -- | -- | -- | **9** |
| gamma-Chlordane | -- | -- | -- | **2** |
| **Total Metals** | | | | |
| Barium | -- | -- | -- | **4** |
| Chromium | **30** | **30** | **400** | **2,000** |
| Cobalt | -- | -- | **2** | **1** |
| Copper | -- | -- | -- | **70** |
| Lead | -- | -- | **1** | **20** |
| Manganese | -- | -- | **2** | **7** |
| Mercury | -- | **2** | **5** | **40** |
| Nickel | -- | -- | **10** | **3** |
| Selenium | *2* | *2* | **3** | **8** |
| Thallium | **4** | **2** | **4** | **3** |
| Zinc | -- | -- | **1** | **40** |

**Notes:** Shading and italics indicate COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ) – see Step 3a Refinement for further discussion; **Bold text** indicates the HQ for detected COPECs evaluated using their maximum detected concentration; -- = Not Evaluated or Not a COPEC for Chemical/Exposure Area/Medium; AOC = Area of Concern; COPEC = Chemical of Potential Ecological Concern

## Table 3-2. Direct Contact COPECs (Sediment, Surface Water, and Pore Water)

| COPEC | Sediment Hazard Quotient (HQ) | | SW HQ | PW HQ |
|---|---|---|---|---|
| | Upgradient Drainage | Downgradient Estuarine | | |
| **Volatile Organic Compounds** | | | | |
| 1,1,2-Trichlorotrifluoroethane | -- | -- | *900* | *600* |
| 1,2-Dibromo-3-chloropropane | -- | -- | *300* | *200* |
| 1,2-Dibromoethane | -- | -- | *60* | *100* |
| 1,2-Dichlorobenzene | -- | -- | -- | *1* |
| Acetone | -- | **5** | -- | -- |
| Carbon disulfide | **10** | **200** | -- | **30** |
| Chloroethane | -- | -- | *100* | *100* |
| Chloromethane | -- | -- | *30* | *70* |
| cis-1,3-Dichloropropene | -- | -- | *3* | *10* |
| Dichlorodifluoromethane | -- | -- | *100* | *100* |
| Hexachlorobutadiene | -- | -- | -- | *1* |
| Methyl acetate | -- | -- | *200* | *90* |
| trans-1,3-Dichloropropene | -- | -- | *4* | *10* |
| Trichlorofluoromethane | -- | -- | *50* | *200* |
| **Semi-Volatile Organic Compounds** | | | | |
| 2-Chloronaphthalene | -- | -- | *30,000* | *10,000* |
| 4,6-Dinitro-o-cresol | -- | -- | *6,000* | *10,000* |
| 4-Bromophenyl phenyl ether | -- | -- | *7,000* | *7,000* |
| 4-Chloro-3-methyl phenol | -- | -- | *1* | -- |
| 4-Chloroaniline | -- | *2* | -- | -- |
| 4-Chlorophenyl phenyl ether | -- | -- | *6,000* | *5,000* |
| Acetophenone | -- | -- | *50* | *90* |
| bis(2-Chloroethoxy)methane | -- | -- | *30* | *20* |
| bis(2-Chloroethyl)ether | -- | -- | *50* | *30* |
| bis(2-Chloroisopropyl)ether | -- | -- | *200* | *100* |
| bis(2-Ethylhexyl)phthalate | -- | **900** | -- | -- |
| Caprolactam | -- | -- | *200* | *2,000* |
| Di-n-butyl phthalate | -- | -- | -- | *1* |
| Di-n-octyl phthalate | -- | **80** | -- | -- |
| Hexachlorobenzene | -- | -- | *2,000* | *3,000* |
| Hexachlorocyclopentadiene | -- | -- | *7* | *50* |
| n-Nitroso-di-n-propylamine | -- | -- | *900* | *2,000* |
| Pentachlorophenol | -- | -- | *4* | *3* |
| **Pesticides** | | | | |
| alpha-Chlordane | -- | -- | *1* | -- |
| Heptachlor | -- | -- | *2* | -- |
| Toxaphene | *2* | *4* | *600* | -- |
| Total DDD/DDE/DDT | **40** | -- | -- | -- |

| COPEC | Sediment Hazard Quotient (HQ) | | SW HQ | PW HQ |
|---|---|---|---|---|
| | Upgradient Drainage | Downgradient Estuarine | | |
| **Polychlorinated Biphenyls** | | | | |
| Aroclor 1016 | -- | -- | *1,000* | -- |
| Aroclor 1221 | -- | -- | *7,000* | -- |
| Aroclor 1232 | -- | -- | *6,000* | -- |
| Aroclor 1242 | -- | -- | *3,000* | -- |
| Aroclor 1248 | -- | -- | *2,000* | -- |
| Aroclor 1254 | -- | -- | *2,000* | -- |
| Aroclor 1260 | -- | -- | *2,000* | -- |
| **Dioxins and Furans** | | | | |
| Total TEQ (Fish) | -- | **3** | -- | -- |
| **Total Cyanide** | | | | |
| Cyanide | *7* | *20* | *10,000* | -- |
| **Total Metals** | | | | |
| Aluminum | -- | **1** | **10** | *2,000* |
| Antimony | **1** | *1* | -- | *500* |
| Arsenic | **2** | **3** | **2** | **7** |
| Barium | **4** | **3** | **7** | **10** |
| Cadmium | **2** | -- | *10* | **10** |
| Calcium | -- | -- | **2** | **3** |
| Chromium | -- | **1** | **1** | **2** |
| Cobalt | -- | -- | -- | *600* |
| Copper | **3** | **1** | **2** | *2,000* |
| Iron | **1** | **2** | **3** | -- |
| Lead | **3** | **2** | **2** | *4,000* |
| Magnesium | -- | -- | **10** | **10** |
| Manganese | -- | -- | -- | **1** |
| Mercury | **4** | -- | **6** | **2** |
| Nickel | **1** | **2** | -- | -- |
| Potassium | -- | -- | **9** | **9** |
| Selenium | -- | **2** | **10** | *20,000* |
| Silver | **2** | -- | *10* | *20,000* |
| Sodium | -- | -- | **10** | **30** |
| Thallium | -- | -- | *3* | *30,000* |
| Zinc | **3** | -- | -- | -- |

**Notes:** Shading and italics indicate COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ) – see Step 3a Refinement for further discussion; **Bold text** indicates the HQ for detected COPECs evaluated using their maximum detected concentration; -- = Not Evaluated or Not a COPEC for Chemical/Exposure Area/Medium; COPEC = Chemical of Potential Ecological Concern; PW = Pore Water; SW = Surface Water

## Table 3-3. Wildlife Dose Rate Model COPECs

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| **Northern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | **2** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Mercury | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Western AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | **2** | **1** | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Lead | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Mercury | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Central AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | **2** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Total HMW PAHs | <1 | **4** | <1 | **1** | **11** | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **3** | **8** | <1 | **4** | **6** | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Cadmium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Chromium | <1 | **3** | <1 | <1 | **2** | <1 | -- | -- | -- | -- |
| Lead | <1 | **5** | <1 | <1 | **1** | <1 | -- | -- | -- | -- |
| Mercury | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Nickel | <1 | **13** | <1 | **4** | **43** | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **1** | **1** | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **2** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **1** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Southern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | **6** | **3** | <1 | <1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **15** | **39** | <1 | **21** | **29** | -- | -- | -- | -- |
| **Polychlorinated Biphenyls** | | | | | | | | | | |
| Aroclor 1260 | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Dioxin and Furans** | | | | | | | | | | |

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| Total TEQ (Bird) | <1 | **9** | <1 | -- | -- | -- | -- | -- | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | <1 | **72** | **3** | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Antimony | -- | -- | -- | **15** | **149** | **1** | -- | -- | -- | -- |
| Cadmium | <1 | **3** | <1 | **1** | **5** | <1 | -- | -- | -- | -- |
| Chromium | **2** | **14** | **2** | **4** | **12** | <1 | -- | -- | -- | -- |
| Copper | **10** | **22** | **6** | **9** | **5** | **1** | -- | -- | -- | -- |
| Lead | **10** | **56** | **7** | **4** | **13** | <1 | -- | -- | -- | -- |
| Mercury | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Nickel | <1 | **3** | <1 | **1** | **11** | <1 | -- | -- | -- | -- |
| Selenium | <1 | **2** | <1 | **4** | **3** | <1 | -- | -- | -- | -- |
| Silver | <1 | **13** | <1 | <1 | **4** | <1 | -- | -- | -- | -- |
| Vanadium | **1** | **3** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **4** | <1 | **2** | **3** | <1 | -- | -- | -- | -- |
| **Upgradient Drainage** | | | | | | | | | | |
| **Pesticides** | | | | | | | | | | |
| Total DDD/DDE/DDT | -- | -- | -- | -- | -- | -- | **4** | <1 | <1 | <1 |
| **Metals** | | | | | | | | | | |
| Arsenic | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Cadmium | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Copper | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Lead | -- | -- | -- | -- | -- | -- | **1** | <1 | <1 | <1 |
| Mercury | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Nickel | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Silver | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **3** | <1 | <1 | <1 |
| Zinc | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| **Downgradient Estuarine** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | -- | -- | **519** | **147** | **2** | **6** |
| Di-n-octyl phthalate | -- | -- | -- | -- | -- | -- | -- | -- | <1 | <1 |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | -- | -- | -- | -- | -- | -- | **1** | <1 | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | -- | -- | -- | -- | -- | <1 | **3** |
| **Metals** | | | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | **71** | **20** | **233** | **705** |
| Arsenic | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Chromium | -- | -- | -- | -- | -- | -- | **4** | **1** | <1 | <1 |
| Copper | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Lead | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| Mercury | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Nickel | -- | -- | -- | -- | -- | -- | <1 | <1 | <1 | <1 |
| Selenium | -- | -- | -- | -- | -- | -- | **5** | **1** | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **5** | **1** | <1 | <1 |

**Notes:** -- = Not Evaluated or Not a COPEC for Chemical/Exposure Area; AR = American Robin; COPEC = Chemical of Potential Ecological Concern; MK = Mink; MV = Meadow Vole; MW = Marsh Wren; NB = Northern Bobwhite; OS = Osprey; RC = Raccoon; RF = Red Fox; RH = Red-Tailed Hawk; SS = Short-Tailed Shrew

## Table 4-1. SLERA Step 2 Detected COPECs

| COPEC | Terrestrial | | | | Aquatic/Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|
| | N | W | C | S | $U_{SD}$ | $D_{SD}$ | $D_{SW}$ | $D_{PW}$ |
| **Volatile Organic Compounds** | | | | | | | | |
| Acetone | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Carbon disulfide | ○ | ○ | ○ | ○ | ● | ● | ○ | ● |
| **Semi-Volatile Organic Compounds** | | | | | | | | |
| Benzaldehyde | – | – | ● | ○ | – | ○ | – | ○ |
| bis(2-Ethylhexyl)phthalate | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Di-n-octyl phthalate | ○ | ○ | ○ | ○ | ○ | ● | ○ | ○ |
| Total HMW PAHs | ○ | ○ | ● | ○ | – | – | – | – |
| **Pesticides** | | | | | | | | |
| alpha-Chlordane | ○ | ○ | ○ | ● | ○ | ○ | LOQ | – |
| gamma-Chlordane | ○ | ○ | ○ | ● | ○ | ○ | ○ | – |
| Total DDD/DDE/DDT | ○ | ○ | ○ | ○ | ● | ○ | ○ | – |
| **Dioxins and Furans** | | | | | | | | |
| Total TEQ (Bird) | – | – | – | ○ | – | ○ | – | ○ |
| Total TEQ (Fish) | – | – | – | – | – | ● | – | ○ |
| Total TEQ (Mammal) | – | – | – | ○ | – | ○ | – | ○ |
| **Total Metals** | | | | | | | | |
| Aluminum | ○ | ○ | ○ | ○ | ○ | ● | ● | LOQ |
| Antimony | ○ | ○ | ○ | ○ | ● | LOQ | ○ | LOQ |
| Arsenic | ○ | ○ | ○ | ○ | ● | ● | ● | ● |
| Barium | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| Cadmium | ○ | ○ | ○ | ○ | ● | ○ | LOQ | ● |
| Calcium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Chromium | ● | ● | ● | ● | ○ | ● | ● | ● |
| Cobalt | ○ | ○ | ● | ● | ○ | ○ | ○ | LOQ |
| Copper | ○ | ○ | ○ | ● | ● | ● | ● | LOQ |
| Iron | ○ | ○ | ○ | ○ | ● | ● | ● | ○ |
| Lead | ○ | ○ | ● | ● | ● | ● | ● | LOQ |
| Magnesium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Manganese | ○ | ○ | ● | ● | ○ | ○ | ○ | ● |
| Mercury | ○ | ● | ● | ● | ● | ○ | ● | ● |
| Nickel | ○ | ○ | ● | ● | ● | ● | ○ | ○ |
| Potassium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Selenium | LOQ | LOQ | ● | ● | ○ | ● | ● | LOQ |
| Silver | ○ | ○ | ○ | ○ | ● | ○ | LOQ | LOQ |
| Sodium | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● |
| Thallium | ● | ● | ● | ● | ○ | ○ | LOQ | LOQ |
| Vanadium | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Zinc | ○ | ○ | ● | ● | ● | ○ | ○ | ○ |

**Notes**: COPEC = Constituent of Potential Ecological Concern; N = Northern AOC; W = Western AOC; C = Central AOC; S = Southern AOC; $U_{SD}$ = Upgradient Drainage Sediment; $D_{SD}$ = Downgradient Estuarine Sediment; $D_{SW}$ = Downgradient Estuarine Surface Water; $D_{PW}$= Downgradient Estuarine Pore Water; – indicates that data was not evaluated/available for exposure area/medium; ○ indicates that data was evaluated for exposure area/medium, but COI not selected as a direct contact COPEC; ● indicates direct contact COPEC for exposure area/medium; yellow highlighting indicates wildlife COPEC for exposure area/medium; LOQ indicates that COPEC was all non-detect and will be reviewed in **Section 4.1.1**.

## Table 4-2. COPECs Excluded from Step 3a Evaluation

| COPEC | Exposure Areas [1] | FOD [2] | Retain? | Rationale |
|---|---|---|---|---|
| **Volatile Organic Compounds** | | | | |
| 1,1,2-Trichlorotrifluoroethane | $D_{SW}$, $D_{PW}$ | 0/167 | No | Not detected in any sample |
| 1,2-Dibromo-3-chloropropane | $D_{SW}$, $D_{PW}$ | 0/167 | No | Not detected in any sample |
| 1,2-Dibromoethane | $D_{SW}$, $D_{PW}$ | 0/167 | No | Not detected in any sample |
| 1,2-Dichlorobenzene | $D_{PW}$ | 0/167 | No | Not detected in any sample |
| Chloroethane | $D_{SW}$, $D_{PW}$ | 1/167 | No | Detected in ~0.6% of samples |
| Chloromethane | $D_{SW}$, $D_{PW}$ | 0/167 | No | Not detected in any sample |
| cis-1,3-Dichloropropene | $D_{SW}$, $D_{PW}$ | 0/166 | No | Not detected in any sample |
| Dichlorodifluoromethane | $D_{SW}$, $D_{PW}$ | 0/167 | No | Not detected in any sample |
| Hexachlorobutadiene | $D_{PW}$ | 0/169 | No | Not detected in any sample |
| Methyl acetate | $D_{SW}$, $D_{PW}$ | 2/167 | No | Detected in ~1% of samples |
| trans-1,3-Dichloropropene | $D_{SW}$, $D_{PW}$ | 0/166 | No | Not detected in any sample |
| Trichlorofluoromethane | $D_{SW}$, $D_{PW}$ | 0/167 | No | Not detected in any sample |
| **Semi-Volatile Organic Compounds** | | | | |
| Atrazine | C, S | 0/169 | No | Not detected in any sample |
| 2-Chloronaphthalene | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| 4,6-Dinitro-o-cresol | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| 4-Bromophenyl phenyl ether | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| 4-Chloro-3-methyl phenol | $D_{SW}$ | 0/169 | No | Not detected in any sample |
| 4-Chloroaniline | $D_{SD}$ | 0/169 | No | Not detected in any sample |
| 4-Chlorophenyl phenyl ether | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| Acetophenone | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| bis(2-Chloroethoxy)methane | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| bis(2-Chloroethyl)ether | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| bis(2-Chloroisopropyl)ether | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| Caprolactam | $D_{SW}$, $D_{PW}$ | 3/169 | No | Detected in ~2% of samples |
| Di-n-butyl phthalate | $D_{PW}$ | 2/169 | No | Detected in ~1% of samples |
| Hexachlorobenzene | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| Hexachlorocyclopentadiene | $D_{SW}$, $D_{PW}$ | 0/165 | No | Not detected in any sample |
| n-Nitroso-di-n-propylamine | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| Pentachlorophenol | $D_{SW}$, $D_{PW}$ | 0/169 | No | Not detected in any sample |
| **Pesticides** | | | | |
| alpha-Chlordane | $D_{SW}$ | 1/67 | No | Detected in ~2% of samples |
| Heptachlor | $D_{SW}$ | 0/67 | No | Not detected in any sample |
| Toxaphene | $U_{SD}$, $D_{SD}$, $D_{SW}$ | 0/67 | No | Not detected in any sample |
| **Polychlorinated Biphenyls** | | | | |
| Aroclor 1016 | $D_{SW}$ | 0/67 | No | Not detected in any sample |
| Aroclor 1221 | $D_{SW}$ | 0/67 | No | Not detected in any sample |
| Aroclor 1232 | $D_{SW}$ | 0/67 | No | Not detected in any sample |

| COPEC | Exposure Areas [1] | FOD [2] | Retain? | Rationale |
|---|---|---|---|---|
| Aroclor 1242 | $D_{SW}$ | 0/67 | No | Not detected in any sample |
| Aroclor 1248 | $D_{SW}$ | 0/67 | No | Not detected in any sample |
| Aroclor 1254 | $D_{SW}$ | 0/67 | No | Not detected in any sample |
| Aroclor 1260 | $D_{SW}$ | 1/67 | No | Detected in ~2% of samples |
| **Total Cyanide** | | | | |
| Cyanide | $U_{SD}$, $D_{SW}$ | 0/67 | No | Not detected in any sample |
| **Total Metals** | | | | |
| Aluminum | $D_{PW}$ | 119/170 | **Yes** | Detected >5% across WFF |
| Antimony | $D_{SD}$, $D_{PW}$ | 26/170 | **Yes** | Detected >5% across WFF |
| Cadmium | $D_{SW}$ | 73/170 | **Yes** | Detected >5% across WFF |
| Cobalt | $D_{PW}$ | 104/170 | **Yes** | Detected >5% across WFF |
| Copper | $D_{PW}$ | 104/170 | **Yes** | Detected >5% across WFF |
| Lead | $D_{PW}$ | 111/170 | **Yes** | Detected >5% across WFF |
| Selenium | N, W, $D_{PW}$ | 30/168 | **Yes** | Detected >5% across WFF |
| Silver | $D_{SW}$, $D_{PW}$ | 31/170 | **Yes** | Detected >5% across WFF |
| Thallium | $D_{SW}$, $D_{PW}$ | 37/170 | **Yes** | Detected >5% across WFF |

**Notes:** C = Central AOC; COPEC = Constituent of Potential Ecological Concern; $D_{PW}$ = Downgradient Estuarine Pore Water; $D_{SD}$ = Downgradient Estuarine Sediment; $D_{SW}$ = Downgradient Estuarine Surface Water; N = Northern AOC; S = Southern AOC; $U_{SD}$ = Upgradient Drainage Sediment; (1) Refers to all exposure areas where identified as a LOQ COPEC – see **Tables 3-1 and 3-2**); (2) Frequency of detection (FOD) across all exposure areas and media.

## Table 4-3. Refined Direct Contact COPECs (Soil)

| COPEC | Surface Soil Refined Hazard Quotient (HQ) | | | |
|---|---|---|---|---|
| | Northern AOC | Western AOC | Central AOC | Southern AOC |
| **Semi-Volatile Organic Compounds** | | | | |
| Benzaldehyde | -- | -- | <1 | -- |
| Total HMW PAHs | -- | -- | **1** | -- |
| **Pesticides** | | | | |
| alpha-Chlordane | -- | -- | -- | <1 |
| gamma-Chlordane | -- | -- | -- | <1 |
| **Total Metals** | | | | |
| Barium | -- | -- | -- | **2** |
| Chromium | <1 | <1 | **1** | **4** |
| Cobalt | -- | -- | **1** | <1 |
| Copper | -- | -- | -- | **30** |
| Lead | -- | -- | <1 | <1 |
| Manganese | -- | -- | <1 | **2** |
| Mercury | -- | <1 | <1 | **2** |
| Nickel | -- | -- | **2** | <1 |
| Selenium | *<1* | *<1* | <1 | <1 |
| Thallium | <1 | <1 | <1 | <1 |
| Zinc | -- | -- | <1 | **11** |

**Notes:** Shading and italics indicate refined COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ); **Bold text** indicates the refined HQ for detected COPECs evaluated using their refined exposure point concentration; -- = Not a COPEC for Exposure Area/Medium; AOC = Area of Concern; COPEC = Chemical of Potential Ecological Concern; highlighting indicates refined HQ > 1

## Table 4-4. Refined Direct Contact COPECs
## (Sediment, Surface Water, and Pore Water)

| COPEC | Sediment Hazard Quotient (HQ) | | SW HQ | PW HQ |
|---|---|---|---|---|
| | Upgradient Drainage | Downgradient Estuarine | | |
| **Volatile Organic Compounds** | | | | |
| Acetone | -- | <1 | -- | -- |
| Carbon disulfide | <1 | <1 | -- | <1 |
| **Semi-Volatile Organic Compounds** | | | | |
| bis(2-Ethylhexyl)phthalate | -- | **48** | -- | -- |
| Di-n-octyl phthalate | -- | **3** | -- | -- |
| **Pesticides** | | | | |
| Total DDD/DDE/DDT | **5** | -- | -- | -- |
| **Dioxins and Furans** | | | | |
| Total TEQ (Fish) | -- | **3** | -- | -- |
| **Total Metals** | | | | |
| Aluminum | -- | <1 | **1** | *267* |
| Antimony | <1 | *<1* | -- | *83* |
| Arsenic | <1 | <1 | <1 | <1 |
| Barium | **1** | <1 | <1 | <1 |
| Cadmium | <1 | -- | *1* | **1** |
| Calcium | -- | -- | <1 | <1 |
| Chromium | -- | <1 | <1 | <1 |
| Cobalt | -- | -- | -- | 9 |
| Copper | <1 | <1 | **1** | *1,042* |
| Iron | <1 | <1 | <1 | -- |
| Lead | <1 | <1 | <1 | *299* |
| Magnesium | -- | -- | **1** | **1** |
| Manganese | -- | -- | -- | <1 |
| Mercury | <1 | -- | <1 | <1 |
| Nickel | <1 | <1 | -- | -- |
| Potassium | -- | -- | <1 | <1 |
| Selenium | -- | <1 | <1 | *850* |
| Silver | <1 | -- | *3* | *5,102* |
| Sodium | -- | -- | **1** | **2** |
| Thallium | -- | -- | *<1* | *463* |
| Zinc | <1 | -- | -- | -- |

**Notes:** Shading and italics indicate refined COPEC was not detected within medium and was evaluated using the maximum limit of quantitation (LOQ); **Bold text** indicates the refined HQ for detected COPECs evaluated using their refined exposure point concentration; -- = Not a COPEC for Exposure Area/Medium; COPEC = Chemical of Potential Ecological Concern; PW = Pore Water; SW = Surface Water; highlighting indicates refined HQ > 1

## Table 4-5. Refined Wildlife Dose Rate Model COPECs

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| **Northern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Vanadium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Western AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | **1**/<1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Vanadium | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Central AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Total HMW PAHs | <1 | **2**/<1 | <1 | **1**/<1 | **9**/<1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **1**/<1 | **8**/<1 | <1 | **4**/<1 | **5**/<1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Chromium | <1 | **1**/<1 | <1 | <1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Lead | <1 | **2**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Nickel | **1**/<1 | **6/2** | <1 | **4**/<1 | **34/8** | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **1**/<1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **<1** | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Southern AOC** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | <1 | <1 | **1**/<1 | <1 | <1 | <1 | -- | -- | -- | -- |
| **Pesticide** | | | | | | | | | | |
| Total DDD/DDE/DDT | <1 | **6**/<1 | **39/2** | <1 | **22**/<1 | **26**/<1 | -- | -- | -- | -- |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | <1 | **3**/<1 | <1 | -- | -- | -- | -- | -- | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | <1 | **57/6** | **4**/<1 | -- | -- | -- | -- |
| **Metals** | | | | | | | | | | |
| Antimony | -- | -- | -- | **7**/<1 | **55/1** | **1**/<1 | -- | -- | -- | -- |
| Cadmium | <1 | <1 | <1 | <1 | **2**/<1 | <1 | -- | -- | -- | -- |
| Chromium | **1**/<1 | **4**/<1 | <1 | **2**/<1 | **4**/<1 | <1 | -- | -- | -- | -- |
| Copper | **5**/<1 | **11/1** | **3**/<1 | **5**/<1 | **3**/<1 | <1 | -- | -- | -- | -- |

| COPEC | Terrestrial | | | | | | Aquatic and Semi-Aquatic | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NB | AR | RH | MV | SS | RF | MW | OS | RC | MK |
| Lead | **5**/<1 | **15**/<1 | **3**/<1 | **2**/<1 | **5**/<1 | <1 | -- | -- | -- | -- |
| Nickel | <1 | <1 | <1 | <1 | **4**/<1 | <1 | -- | -- | -- | -- |
| Selenium | <1 | <1 | <1 | **2**/<1 | **2**/<1 | <1 | -- | -- | -- | -- |
| Silver | <1 | **2**/<1 | <1 | <1 | **1**/<1 | <1 | -- | -- | -- | -- |
| Vanadium | <1 | **1**/<1 | <1 | <1 | <1 | <1 | -- | -- | -- | -- |
| Zinc | <1 | **2**/<1 | <1 | **1**/<1 | **2**/<1 | <1 | -- | -- | -- | -- |
| **Upgradient Drainage** | | | | | | | | | | |
| **Pesticides** | | | | | | | | | | |
| Total DDD/DDE/DDT | -- | -- | -- | -- | -- | -- | **4**/<1 | <1 | <1 | <1 |
| **Metals** | | | | | | | | | | |
| Lead | -- | -- | -- | -- | -- | -- | **1**/<1 | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **3**/<1 | <1 | <1 | <1 |
| **Downgradient Estuarine** | | | | | | | | | | |
| **Semi-Volatile Organic Compounds** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | -- | -- | -- | -- | -- | -- | **402/40** | **113/11** | **1**/<1 | **4**/<1 |
| **Dioxin and Furans** | | | | | | | | | | |
| Total TEQ (Bird) | -- | -- | -- | -- | -- | -- | <1 | <1 | -- | -- |
| Total TEQ (Mammal) | -- | -- | -- | -- | -- | -- | -- | -- | <1 | **2**/<1 |
| **Metals** | | | | | | | | | | |
| Aluminum | -- | -- | -- | -- | -- | -- | **52/5** | **14/1** | **170/17** | **514/51** |
| Chromium | -- | -- | -- | -- | -- | -- | **3**/<1 | <1 | <1 | <1 |
| Selenium | -- | -- | -- | -- | -- | -- | **3/1** | <1 | <1 | <1 |
| Vanadium | -- | -- | -- | -- | -- | -- | **4/1** | <1 | <1 | <1 |

**Notes:** "**5/8**" indicates NOAE/LOAEL HQs; "<1" indicates both NOAEL and LOAEL HQs are less than 1;

-- = Not a COPEC for Chemical/Exposure Area; AR = American Robin; COPEC = Chemical of Potential Ecological Concern; MK = Mink; MV = Meadow Vole; MW = Marsh Wren; NB = Northern Bobwhite; OS = Osprey; RC = Raccoon; RF = Red Fox; RH = Red-Tailed Hawk; SS = Short-Tailed Shrew; highlighting indicates LOAEL HQ > 1

# Attachment A

## Direct Contact Evaluation and Preliminary Wildlife Screening

**Table 1**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Northern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000053 – 0.000066 | 0.000066 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 260 | USEPA (2018) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000051 – 0.000064 | 0.000064 | LOQ | 0.19 | USEPA (2018) | 0.0003 | No | 0.127 | USEPA (2018) | No | No |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.00006 | 0.00006 | LOQ | 0.32 | USEPA (2018) | 0.0002 | No | 28.6 | USEPA (2018) | No | No |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000076 – 0.000096 | 0.000096 | LOQ | 8.54 | Modeled; USEPA (2018) | 0.00001 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000054 | 0.000054 | LOQ | 0.14 | USEPA (2018) | 0.0004 | No | 210 | USEPA (2018) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000077 | 0.000077 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 11 | USEPA (2018) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.000039 | 0.000039 | LOQ | 1.2 | USEPA (2018) | 0.00003 | No | 0.27 | USEPA (2018) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000019 – 0.00024 | 0.00024 | LOQ | 4.34 | Modeled; USEPA (2018) | 0.00006 | No | 0.0352 | USEPA (2003) | No | No |
| 1,2-Dibromoethane | 106-93-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000005 – 0.000063 | 0.000063 | LOQ | 4.58 | Modeled; USEPA (2018) | 0.00001 | No | 1.23 | USEPA (2003) | No | No |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000051 | 0.000051 | LOQ | 0.09 | USEPA (2018) | 0.0006 | No | 0.92 | USEPA (2018) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000061 | 0.000061 | LOQ | 0.4 | USEPA (2018) | 0.0002 | No | 0.85 | USEPA (2018) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000062 | 0.000062 | LOQ | 0.28 | USEPA (2018) | 0.0002 | No | 32.7 | USEPA (2018) | No | No |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000055 | 0.000055 | LOQ | 0.08 | USEPA (2018) | 0.0007 | No | 0.74 | USEPA (2018) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000051 | 0.000051 | LOQ | 1.2 | USEPA (2018) | 0.00004 | No | 0.89 | USEPA (2018) | No | No |
| 2-Butanone (MEK) | 78-93-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000024 – 0.00031 | 0.00031 | LOQ | 1 | USEPA (2018) | 0.0003 | No | 350 | USEPA (2018) | No | No |
| 2-Hexanone | 591-78-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000012 – 0.00015 | 0.00015 | LOQ | 2.5 | USEPA (2018) | 0.00006 | No | 0.36 | USEPA (2018) | No | No |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000018 – 0.00022 | 0.00022 | LOQ | 5.19 | Modeled; USEPA (2018) | 0.00004 | No | 443 | USEPA (2003) | No | No |
| Acetone | 67-64-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000025 – 0.00032 | 0.00032 | LOQ | 0.04 | USEPA (2018) | 0.008 | No | 1.2 | USEPA (2018) | No | No |
| Benzene | 71-43-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000054 | 0.000054 | LOQ | 0.12 | USEPA (2018) | 0.0005 | No | 24 | USEPA (2018) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000051 | 0.000051 | LOQ | 7.02 | Modeled; USEPA (2018) | 0.000007 | No | 0.54 | USEPA (2003) | No | No |
| Bromoform | 75-25-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.000049 | 0.000049 | LOQ | 0.07 | USEPA (2018) | 0.0007 | No | 15.9 | USEPA (2018) | No | No |
| Bromomethane | 74-83-9 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000033 – 0.000041 | 0.000041 | LOQ | 0.002 | USEPA (2018) | 0.02 | No | 0.24 | USEPA (2018) | No | No |
| Carbon disulfide | 75-15-0 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000062 | 0.000062 | LOQ | 0.005 | USEPA (2018) | 0.01 | No | 0.81 | USEPA (2018) | No | No |
| Carbon tetrachloride | 56-23-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000084 – 0.00011 | 0.00011 | LOQ | 0.05 | USEPA (2018) | 0.002 | No | 2.98 | USEPA (2018) | No | No |
| Chlorobenzene | 108-90-7 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.000048 | 0.000048 | LOQ | 2.4 | USEPA (2018) | 0.00002 | No | 43 | USEPA (2018) | No | No |
| Chloroethane | 75-00-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000015 – 0.00019 | 0.00019 | LOQ | 2.77 | Modeled; USEPA (2018) | 0.00007 | No | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000052 – 0.000065 | 0.000065 | LOQ | 0.05 | USEPA (2018) | 0.001 | No | 8 | USEPA (2018) | No | No |
| Chloromethane | 74-87-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000052 | 0.000052 | LOQ | 3.87 | Modeled; USEPA (2018) | 0.00001 | No | 10.4 | USEPA (2003) | No | No |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000006 – 0.000075 | 0.000075 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.000046 | 0.000046 | LOQ | 0.001 | USEPA (2018) | 0.05 | No | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000011 – 0.00014 | 0.00014 | LOQ | 1.46 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000061 | 0.000061 | LOQ | 7.46 | Modeled; USEPA (2018) | 0.000008 | No | 2.05 | USEPA (2003) | No | No |
| Dichlorodifluoromethane | 75-71-8 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000071 – 0.000089 | 0.000089 | LOQ | 26.4 | Modeled; USEPA (2018) | 0.000003 | No | 39.5 | USEPA (2003) | No | No |
| Ethylbenzene | 100-41-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.00005 | 0.00005 | LOQ | 0.27 | USEPA (2018) | 0.0002 | No | 5.16 | USEPA (2018) | No | No |
| Hexachlorobutadiene | 87-68-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | 0.009 | USEPA (2018) | 0.003 | No | 0.04 | USEPA (2018) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000052 | 0.000052 | LOQ | 0.04 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000078 – 0.000098 | 0.000098 | LOQ | 0.1 | USEPA (2018) | 0.001 | No | 1.4 | USEPA (2018) | No | No |
| Methyl acetate | 79-20-9 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000013 – 0.00016 | 0.00016 | LOQ | 1.65 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000005 – 0.000063 | 0.000063 | LOQ | 2.84 | Modeled; USEPA (2018) | 0.00002 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000057 – 0.000072 | 0.000072 | LOQ | 1.87 | Modeled; USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000077 | 0.000077 | LOQ | 0.21 | USEPA (2018) | 0.0004 | No | 2.6 | USEPA (2018) | No | No |
| Naphthalene | 91-20-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.000021 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| o-Xylene | 95-47-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000044 – 0.000055 | 0.000055 | LOQ | 0.1 | USEPA (2018) | 0.0006 | No | 1.4 | USEPA (2018) | No | No |
| Styrene | 100-42-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000029 – 0.000037 | 0.000037 | LOQ | 1.2 | USEPA (2018) | 0.00003 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000073 – 0.000092 | 0.000092 | LOQ | 0.06 | USEPA (2018) | 0.002 | No | 0.18 | USEPA (2018) | No | No |
| Toluene | 108-88-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000061 | 0.000061 | LOQ | 0.15 | USEPA (2018) | 0.0004 | No | 23 | USEPA (2018) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000076 | 0.000076 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 0.784 | USEPA (2018) | No | No |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.000044 | 0.000044 | LOQ | 0.001 | USEPA (2018) | 0.04 | No | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000046 – 0.000058 | 0.000058 | LOQ | 0.06 | USEPA (2018) | 0.001 | No | 42 | USEPA (2018) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000065 – 0.000081 | 0.000081 | LOQ | 7.04 | Modeled; USEPA (2018) | 0.00001 | No | 16.4 | USEPA (2018) | No | No |

**Table 1**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Northern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000057 – 0.000072 | 0.000072 | LOQ | 0.03 | USEPA (2018) | 0.002 | No | 0.12 | USEPA (2018) | No | No |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000044 – 0.000055 | 0.000055 | LOQ | 0.1 | USEPA (2018) | 0.0006 | No | 1.4 | USEPA (2018) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 0.2 | USEPA (2018) | 0.00009 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000052 – 0.000055 | 0.000055 | LOQ | 4 | USEPA (2018) | 0.00001 | No | 14.1 | USEPA (2018) | No | No |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000029 – 0.000031 | 0.000031 | LOQ | 10 | USEPA (2018) | 0.000003 | No | 9.94 | USEPA (2018) | No | No |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000058 – 0.000062 | 0.000062 | LOQ | 0.05 | USEPA (2018) | 0.001 | No | 87.5 | USEPA (2018) | No | No |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00009 – 0.000095 | 0.000095 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000053 – 0.000056 | 0.000056 | LOQ | 0.15 | USEPA (2018) | 0.0004 | No | 0.061 | USEPA (2018) | No | No |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000041 – 0.000043 | 0.000043 | LOQ | 6 | USEPA (2018) | 0.000007 | No | 14 | USEPA (2018) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00004 – 0.000042 | 0.000042 | LOQ | 30 | USEPA (2018) | 0.000001 | No | 4 | USEPA (2018) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000049 – 0.000052 | 0.000052 | LOQ | 8.18 | Modeled; USEPA (2018) | 0.000006 | No | 0.0122 | USEPA (2003) | No | No |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000032 | LOQ | 0.06 | USEPA (2018) | 0.0005 | No | 0.39 | USEPA (2018) | No | No |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000034 – 0.000036 | 0.000036 | LOQ | 0.1 | USEPA (2018) | 0.0004 | No | 580 | USEPA (2018) | No | No |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.000023 | LOQ | 0.02 | USEPA (2018) | 0.001 | No | 5.3 | USEPA (2018) | No | No |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000043 – 0.000046 | 0.000046 | LOQ | 7 | USEPA (2018) | 0.000007 | No | 5.12 | USEPA (2018) | No | No |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00005 – 0.000053 | 0.000053 | LOQ | 0.09 | USEPA (2018) | 0.0006 | No | 3.49 | USEPA (2018) | No | No |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000033 – 0.000035 | 0.000035 | LOQ | 0.03 | USEPA (2018) | 0.001 | No | 0.646 | USEPA (2018) | No | No |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.000029 | LOQ | 0.02 | USEPA (2018) | 0.001 | No | 5.3 | USEPA (2018) | No | No |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000032 | LOQ | 3.28 | Modeled; USEPA (2018) | 0.00001 | No | 0.144 | USEPA (2003) | No | No |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000044 – 0.000047 | 0.000047 | LOQ | 2.37 | Modeled; USEPA (2018) | 0.00002 | No | 7.95 | USEPA (2003) | No | No |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.000023 | LOQ | 1 | USEPA (2018) | 0.00002 | No | 1.1 | USEPA (2018) | No | No |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.000017 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000026 | 0.000026 | LOQ | 0.02 | USEPA (2018) | 0.001 | No | 5.3 | USEPA (2018) | No | No |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000048 – 0.00005 | 0.00005 | LOQ | 7 | USEPA (2018) | 0.000007 | No | 5.12 | USEPA (2018) | No | No |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.000015 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.000023 | LOQ | 6.35 | Modeled; USEPA (2018) | 0.000004 | No | 300 | USEPA (2003) | No | No |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000014 | 0.000014 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000032 | LOQ | 0.00005 | USEPA (2018) | 0.6 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.000013 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.000017 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00002 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000028 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | 7.84 | Modeled; USEPA (2018) | 0.000003 | No | 0.302 | USEPA (2003) | No | No |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 6.44 | Modeled; USEPA (2018) | 0.000003 | No | 23.7 | USEPA (2003) | No | No |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000028 | LOQ | 3.43 | Modeled; USEPA (2018) | 0.000008 | No | 19.9 | USEPA (2003) | No | No |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0558 | J | 0.0558 | J | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 1/4 | 25% | 0.000045 – 0.000047 | 0.0558 | MDC | 8.4 | USEPA (2018) | 0.007 | No | 0.02 | USEPA (2018) | Yes | **Yes** |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000028 | LOQ | 0.59 | USEPA (2018) | 0.00005 | No | 90 | USEPA (2018) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000034 – 0.000036 | 0.000036 | LOQ | 0.986 | Modeled; USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.000015 | LOQ | 0.07 | USEPA (2018) | 0.0002 | No | 79 | USEPA (2018) | No | No |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000014 | 0.000014 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.000017 | LOQ | 0.15 | USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000016 | LOQ | 0.25 | USEPA (2018) | 0.00006 | No | 3600 | USEPA (2018) | No | No |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000016 | LOQ | 10 | USEPA (2018) | 0.000002 | No | 38 | USEPA (2018) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000024 | 0.000024 | LOQ | 0.22 | USEPA (2018) | 0.0001 | No | 0.011 | USEPA (2018) | No | No |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00003 – 0.000032 | 0.000032 | LOQ | 303 | USEPA (2018) | 1E-07 | No | 0.91 | USEPA (2018) | No | No |

**Table 1**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Northern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.000013 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.000015 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.000021 | LOQ | 10 | USEPA (2018) | 0.000002 | No | 0.079 | USEPA (2018) | No | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000025 – 0.000027 | 0.000027 | LOQ | 0.001 | USEPA (2018) | 0.03 | No | 0.755 | USEPA (2018) | No | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 0.024 | USEPA (2018) | 0.0008 | No | 0.6 | USEPA (2018) | No | No |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.000023 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 3.61 | Modeled; USEPA (2018) | 0.000005 | No | 139 | USEPA (2003) | No | No |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000026 | 0.000026 | LOQ | 2.2 | USEPA (2018) | 0.00001 | No | 4.8 | USEPA (2018) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000024 | 0.000024 | LOQ | 1.69 | Modeled; USEPA (2018) | 0.00001 | No | 0.544 | USEPA (2003) | No | No |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.000015 | LOQ | 20 | USEPA (2018) | 8E-07 | No | 0.545 | USEPA (2018) | No | No |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000039 – 0.000041 | 0.000041 | LOQ | 5 | USEPA (2018) | 0.000008 | No | 2.1 | USEPA (2018) | No | No |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000016 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000043 – 0.000046 | 0.000046 | LOQ | 0.79 | USEPA (2018) | 0.00006 | No | 37 | USEPA (2018) | No | No |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.000013 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Total HMW PAHs | HMW-PAH | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | N/A | N/A | -- | 18 | USEPA (2008) | -- | -- | 1.1 | USEPA (2008) | No | No |
| Total LMW PAHs | LMW-PAH | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | N/A | N/A | -- | 29 | USEPA (2008) | -- | -- | 100 | USEPA (2008) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000034 – 0.00000036 | 0.00000036 | LOQ | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000037 | 0.00000037 | LOQ | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.00000046 | 0.00000046 | LOQ | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.00000033 | 0.00000033 | LOQ | 0.03 | USEPA (2018) | 0.00001 | No | 0.037 | USEPA (2018) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000026 – 0.00000028 | 0.00000028 | LOQ | 0.0003 | USEPA (2018) | 0.0009 | No | 59 | USEPA (2018) | No | No |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000004 | LOQ | 0.0029 | USEPA (2018) | 0.0001 | No | 0.27 | USEPA (2018) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000003 – 0.00000032 | 0.00000032 | LOQ | 0.0003 | USEPA (2018) | 0.001 | No | 0.27 | USEPA (2018) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000052 – 0.00000055 | 0.00000055 | LOQ | 0.0003 | USEPA (2018) | 0.002 | No | 0.27 | USEPA (2018) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000038 | 0.00000038 | LOQ | 0.0029 | USEPA (2018) | 0.0001 | No | 0.0049 | USEPA (2008) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000004 | LOQ | 0.0007 | USEPA (2018) | 0.0006 | No | 0.036 | USEPA (2018) | No | No |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.0000004 | 0.0000004 | LOQ | 0.0009 | USEPA (2018) | 0.0004 | No | 0.119 | USEPA (2018) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.00000039 | 0.00000039 | LOQ | 0.0009 | USEPA (2018) | 0.0004 | No | 0.119 | USEPA (2018) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000037 | 0.00000037 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000033 – 0.00000035 | 0.00000035 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.00000041 | 0.00000041 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000028 – 0.0000003 | 0.0000003 | LOQ | 0.0031 | USEPA (2018) | 0.0001 | No | 0.0095 | USEPA (2018) | No | No |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000004 | LOQ | 0.02 | USEPA (2018) | 0.00002 | No | 2.2 | USEPA (2018) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000036 – 0.00000039 | 0.00000039 | LOQ | 0.0016 | USEPA (2018) | 0.0002 | No | 0.059 | USEPA (2018) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000041 | 0.00000041 | LOQ | 0.00015 | USEPA (2018) | 0.003 | No | 0.152 | USEPA (2018) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000047 – 0.00000049 | 0.00000049 | LOQ | 0.0021 | USEPA (2018) | 0.0002 | No | 5.1 | USEPA (2018) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000067 – 0.0000071 | 0.0000071 | LOQ | 0.00015 | USEPA (2018) | 0.05 | No | 4.1 | USEPA (2018) | No | No |
| Total DDD/DDE/DDT | TOT-DDT | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | N/A | N/A | -- | 4.05 | Modeled; USEPA (2018) | -- | -- | 0.021 | USEPA (2008) | No | No |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000067 – 0.0000071 | 0.0000071 | LOQ | 0.33 | USEPA (2018) | 0.00002 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000021 – 0.000022 | 0.000022 | LOQ | 0.33 | USEPA (2018) | 0.00007 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00002 | LOQ | 0.33 | USEPA (2018) | 0.00006 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000011 – 0.000012 | 0.000012 | LOQ | 0.33 | USEPA (2018) | 0.00004 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.000013 | LOQ | 0.33 | USEPA (2018) | 0.00004 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 0.33 | USEPA (2018) | 0.00005 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000071 – 0.0000075 | 0.0000075 | LOQ | 0.33 | USEPA (2018) | 0.00002 | No | 0.041 | USEPA (2018) | No | No |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.22 – 0.27 | 0.27 | LOQ | N/A | -- | -- | -- | 0.098 | USEPA (2018) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 5110 | | 14300 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 14300 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |

**Table 1**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Northern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.75 – 0.83 | 0.83 | LOQ | 78 | USEPA (2008) | 0.01 | No | 0.27 | USEPA (2008) | Yes | No |
| Arsenic | 7440-38-2 | 1.1 | | 2.5 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 2.5 | MDC | 18 | USEPA (2008) | 0.1 | No | 43 | USEPA (2008) | No | No |
| Barium | 7440-39-3 | 11.5 | B | 25.7 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 25.7 | MDC | 330 | USEPA (2008) | 0.08 | No | 2000 | USEPA (2008) | No | No |
| Beryllium | 7440-41-7 | 0.1 | B | 0.26 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.26 | MDC | 40 | USEPA (2008) | 0.007 | No | 21 | USEPA (2008) | No | No |
| Cadmium | 7440-43-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.15 – 0.16 | 0.16 | LOQ | 32 | USEPA (2008) | 0.005 | No | 0.36 | USEPA (2008) | No | No |
| Calcium | 7440-70-2 | 297 | B | 580 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 580 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Chromium | 7440-47-3 | 4.8 | | 11.5 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 11.5 | MDC | 0.34 | USEPA (2018) | 30 | Yes | 26 | USEPA (2008) | No | No |
| Cobalt | 7440-48-4 | 1.2 | B | 3.3 | B | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 3.3 | MDC | 13 | USEPA (2008) | 0.3 | No | 120 | USEPA (2008) | No | No |
| Copper | 7440-50-8 | 2.4 | B | 4.9 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 4.9 | MDC | 70 | USEPA (2008) | 0.07 | No | 28 | USEPA (2008) | No | No |
| Iron | 7439-89-6 | 3460 | | 8880 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 8880 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |
| Lead | 7439-92-1 | 2.6 | | 5.2 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 5.2 | MDC | 120 | USEPA (2008) | 0.04 | No | 11 | USEPA (2008) | No | No |
| Magnesium | 7439-95-4 | 384 | B | 887 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 887 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Manganese | 7439-96-5 | 26.2 | | 106 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 106 | MDC | 220 | USEPA (2008) | 0.5 | No | 4000 | USEPA (2008) | No | No |
| Mercury | 7439-97-6 | 0.014 | B | 0.019 | B | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 3/4 | 75% | 0.0089 – 0.0089 | 0.019 | MDC | 0.05 | USEPA (2018) | 0.4 | No | 0.013 | USEPA (2018) | Yes | Yes |
| Nickel | 7440-02-0 | 2.6 | B | 7.2 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 7.2 | MDC | 38 | USEPA (2008) | 0.2 | No | 130 | USEPA (2008) | No | No |
| Potassium | 7440-09-7 | 247 | B | 431 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 431 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Selenium | 7782-49-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.78 – 0.87 | 0.87 | LOQ | 0.52 | USEPA (2008) | 2 | Yes | 0.63 | USEPA (2008) | Yes | No |
| Silver | 7440-22-4 | 0.21 | B | 0.21 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 1/4 | 25% | 0.16 – 0.17 | 0.21 | MDC | 560 | USEPA (2008) | 0.0004 | No | 4.2 | USEPA (2008) | No | No |
| Sodium | 7440-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 79 – 87 | 87 | LOQ | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Thallium | 7440-28-0 | 0.059 | B | 0.18 | B | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.18 | MDC | 0.05 | USEPA (2018) | 4 | Yes | 0.42 | USEPA (2018) | No | No |
| Vanadium | 7440-62-2 | 6.8 | | 16.9 | | mg/kg | SB-6B (4/18/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 16.9 | MDC | 60 | USEPA (2018) | 0.3 | No | 7.8 | USEPA (2008) | Yes | Yes |
| Zinc | 7440-66-6 | 6.5 | | 12.8 | | mg/kg | TP-5A (4/9/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 12.8 | MDC | 120 | USEPA (2008) | 0.1 | No | 46 | USEPA (2008) | No | No |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 2**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Western AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000052 – 0.000063 | 0.000063 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 260 | USEPA (2018) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000005 – 0.000061 | 0.000061 | LOQ | 0.19 | USEPA (2018) | 0.0003 | No | 0.127 | USEPA (2018) | No | No |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000047 – 0.000057 | 0.000057 | LOQ | 0.32 | USEPA (2018) | 0.0002 | No | 28.6 | USEPA (2018) | No | No |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000075 – 0.000091 | 0.000091 | LOQ | 8.54 | Modeled; USEPA (2018) | 0.00001 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000042 – 0.000051 | 0.000051 | LOQ | 0.14 | USEPA (2018) | 0.0004 | No | 210 | USEPA (2018) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000006 – 0.000073 | 0.000073 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 11 | USEPA (2018) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.000037 | 0.000037 | LOQ | 1.2 | USEPA (2018) | 0.00003 | No | 0.27 | USEPA (2018) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000019 – 0.00023 | 0.00023 | LOQ | 4.34 | Modeled; USEPA (2018) | 0.00005 | No | 0.0352 | USEPA (2003) | No | No |
| 1,2-Dibromoethane | 106-93-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.00006 | 0.00006 | LOQ | 4.58 | Modeled; USEPA (2018) | 0.00001 | No | 1.23 | USEPA (2003) | No | No |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000048 | 0.000048 | LOQ | 0.09 | USEPA (2018) | 0.0005 | No | 0.92 | USEPA (2018) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000057 | 0.000057 | LOQ | 0.4 | USEPA (2018) | 0.0001 | No | 0.85 | USEPA (2018) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000059 | 0.000059 | LOQ | 0.28 | USEPA (2018) | 0.0002 | No | 32.7 | USEPA (2018) | No | No |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000052 | 0.000052 | LOQ | 0.08 | USEPA (2018) | 0.0007 | No | 0.74 | USEPA (2018) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000049 | 0.000049 | LOQ | 1.2 | USEPA (2018) | 0.00004 | No | 0.89 | USEPA (2018) | No | No |
| 2-Butanone (MEK) | 78-93-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000024 – 0.00029 | 0.00029 | LOQ | 1 | USEPA (2018) | 0.0003 | No | 350 | USEPA (2018) | No | No |
| 2-Hexanone | 591-78-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000012 – 0.00014 | 0.00014 | LOQ | 2.5 | USEPA (2018) | 0.00006 | No | 0.36 | USEPA (2018) | No | No |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000017 – 0.00021 | 0.00021 | LOQ | 5.19 | Modeled; USEPA (2018) | 0.00004 | No | 443 | USEPA (2003) | No | No |
| Acetone | 67-64-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000025 – 0.0003 | 0.0003 | LOQ | 0.04 | USEPA (2018) | 0.008 | No | 1.2 | USEPA (2018) | No | No |
| Benzene | 71-43-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000042 – 0.000051 | 0.000051 | LOQ | 0.12 | USEPA (2018) | 0.0004 | No | 24 | USEPA (2018) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000048 | 0.000048 | LOQ | 7.02 | Modeled; USEPA (2018) | 0.000007 | No | 0.54 | USEPA (2003) | No | No |
| Bromoform | 75-25-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.000046 | 0.000046 | LOQ | 0.07 | USEPA (2018) | 0.0007 | No | 15.9 | USEPA (2018) | No | No |
| Bromomethane | 74-83-9 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000032 – 0.000039 | 0.000039 | LOQ | 0.002 | USEPA (2018) | 0.02 | No | 0.24 | USEPA (2018) | No | No |
| Carbon disulfide | 75-15-0 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000058 | 0.000058 | LOQ | 0.005 | USEPA (2018) | 0.01 | No | 0.81 | USEPA (2018) | No | No |
| Carbon tetrachloride | 56-23-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000083 – 0.0001 | 0.0001 | LOQ | 0.05 | USEPA (2018) | 0.002 | No | 2.98 | USEPA (2018) | No | No |
| Chlorobenzene | 108-90-7 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.000046 | 0.000046 | LOQ | 2.4 | USEPA (2018) | 0.00002 | No | 43 | USEPA (2018) | No | No |
| Chloroethane | 75-00-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000015 – 0.00018 | 0.00018 | LOQ | 2.77 | Modeled; USEPA (2018) | 0.00006 | No | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000051 – 0.000062 | 0.000062 | LOQ | 0.05 | USEPA (2018) | 0.001 | No | 8 | USEPA (2018) | No | No |
| Chloromethane | 74-87-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.000049 | 0.000049 | LOQ | 3.87 | Modeled; USEPA (2018) | 0.00001 | No | 10.4 | USEPA (2003) | No | No |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000059 – 0.000071 | 0.000071 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000036 – 0.000044 | 0.000044 | LOQ | 0.001 | USEPA (2018) | 0.04 | No | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000011 – 0.00014 | 0.00014 | LOQ | 1.46 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.000058 | 0.000058 | LOQ | 7.46 | Modeled; USEPA (2018) | 0.000008 | No | 2.05 | USEPA (2003) | No | No |
| Dichlorodifluoromethane | 75-71-8 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000007 – 0.000084 | 0.000084 | LOQ | 26.4 | Modeled; USEPA (2018) | 0.000003 | No | 39.5 | USEPA (2003) | No | No |
| Ethylbenzene | 100-41-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.000048 | 0.000048 | LOQ | 0.27 | USEPA (2018) | 0.0002 | No | 5.16 | USEPA (2018) | No | No |
| Hexachlorobutadiene | 87-68-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000025 | 0.000025 | LOQ | 0.009 | USEPA (2018) | 0.003 | No | 0.04 | USEPA (2018) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000041 – 0.000049 | 0.000049 | LOQ | 0.04 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000077 – 0.000093 | 0.000093 | LOQ | 0.1 | USEPA (2018) | 0.0009 | No | 1.4 | USEPA (2018) | No | No |
| Methyl acetate | 79-20-9 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000012 – 0.00015 | 0.00015 | LOQ | 1.65 | Modeled; USEPA (2018) | 0.00009 | No | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000049 – 0.000059 | 0.000059 | LOQ | 2.84 | Modeled; USEPA (2018) | 0.00002 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000056 – 0.000068 | 0.000068 | LOQ | 1.87 | Modeled; USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000061 – 0.000073 | 0.000073 | LOQ | 0.21 | USEPA (2018) | 0.0003 | No | 2.6 | USEPA (2018) | No | No |
| Naphthalene | 91-20-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000022 | 0.000022 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| o-Xylene | 95-47-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000052 | 0.000052 | LOQ | 0.1 | USEPA (2018) | 0.0005 | No | 1.4 | USEPA (2018) | No | No |
| Styrene | 100-42-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000029 – 0.000035 | 0.000035 | LOQ | 1.2 | USEPA (2018) | 0.00003 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000072 – 0.000087 | 0.000087 | LOQ | 0.06 | USEPA (2018) | 0.001 | No | 0.18 | USEPA (2018) | No | No |
| Toluene | 108-88-3 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000047 – 0.000057 | 0.000057 | LOQ | 0.15 | USEPA (2018) | 0.0004 | No | 23 | USEPA (2018) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000006 – 0.000072 | 0.000072 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 0.784 | USEPA (2018) | No | No |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000034 – 0.000041 | 0.000041 | LOQ | 0.001 | USEPA (2018) | 0.04 | No | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000046 – 0.000055 | 0.000055 | LOQ | 0.06 | USEPA (2018) | 0.0009 | No | 42 | USEPA (2018) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | N/A | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000064 – 0.000077 | 0.000077 | LOQ | 7.04 | Modeled; USEPA (2018) | 0.00001 | No | 16.4 | USEPA (2018) | No | No |

**Table 2**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Western AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000057 – 0.000068 | 0.000068 | LOQ | 0.03 | USEPA (2018) | 0.002 | No | 0.12 | USEPA (2018) | No | No |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000043 – 0.000052 | 0.000052 | LOQ | 0.1 | USEPA (2018) | 0.0005 | No | 1.4 | USEPA (2018) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | 0.2 | USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000055 – 0.000058 | 0.000058 | LOQ | 4 | USEPA (2018) | 0.00001 | No | 14.1 | USEPA (2018) | No | No |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000032 | 0.000032 | LOQ | 10 | USEPA (2018) | 0.000003 | No | 9.94 | USEPA (2018) | No | No |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000061 – 0.000064 | 0.000064 | LOQ | 0.05 | USEPA (2018) | 0.001 | No | 87.5 | USEPA (2018) | No | No |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000093 – 0.000099 | 0.000099 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000055 – 0.000059 | 0.000059 | LOQ | 0.15 | USEPA (2018) | 0.0004 | No | 0.061 | USEPA (2018) | No | No |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000042 – 0.000045 | 0.000045 | LOQ | 6 | USEPA (2018) | 0.000008 | No | 14 | USEPA (2018) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000041 – 0.000044 | 0.000044 | LOQ | 30 | USEPA (2018) | 0.000001 | No | 4 | USEPA (2018) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000051 – 0.000054 | 0.000054 | LOQ | 8.18 | Modeled; USEPA (2018) | 0.000007 | No | 0.0122 | USEPA (2003) | No | No |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000033 | 0.000033 | LOQ | 0.06 | USEPA (2018) | 0.0006 | No | 0.39 | USEPA (2018) | No | No |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000024 – 0.000025 | 0.000025 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000036 – 0.000038 | 0.000038 | LOQ | 0.1 | USEPA (2018) | 0.0004 | No | 580 | USEPA (2018) | No | No |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | 0.02 | USEPA (2018) | 0.001 | No | 5.3 | USEPA (2018) | No | No |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000045 – 0.000048 | 0.000048 | LOQ | 7 | USEPA (2018) | 0.000007 | No | 5.12 | USEPA (2018) | No | No |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000052 – 0.000055 | 0.000055 | LOQ | 0.09 | USEPA (2018) | 0.0006 | No | 3.49 | USEPA (2018) | No | No |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000035 – 0.000037 | 0.000037 | LOQ | 0.03 | USEPA (2018) | 0.001 | No | 0.646 | USEPA (2018) | No | No |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000028 – 0.00003 | 0.00003 | LOQ | 0.02 | USEPA (2018) | 0.002 | No | 5.3 | USEPA (2018) | No | No |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000032 – 0.000034 | 0.000034 | LOQ | 3.28 | Modeled; USEPA (2018) | 0.00001 | No | 0.144 | USEPA (2003) | No | No |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.00002 | 0.00002 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000046 – 0.000049 | 0.000049 | LOQ | 2.37 | Modeled; USEPA (2018) | 0.00002 | No | 7.95 | USEPA (2003) | No | No |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | 1 | USEPA (2018) | 0.00002 | No | 1.1 | USEPA (2018) | No | No |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000025 – 0.000027 | 0.000027 | LOQ | 0.02 | USEPA (2018) | 0.001 | No | 5.3 | USEPA (2018) | No | No |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000049 – 0.000052 | 0.000052 | LOQ | 7 | USEPA (2018) | 0.000007 | No | 5.12 | USEPA (2018) | No | No |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00002 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000016 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | 6.35 | Modeled; USEPA (2018) | 0.000004 | No | 300 | USEPA (2003) | No | No |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000014 – 0.000015 | 0.000015 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000033 | 0.000033 | LOQ | 0.00005 | USEPA (2018) | 0.7 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000013 | 0.000013 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.000021 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.000029 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000025 | 0.000025 | LOQ | 7.84 | Modeled; USEPA (2018) | 0.000003 | No | 0.302 | USEPA (2003) | No | No |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | 6.44 | Modeled; USEPA (2018) | 0.000003 | No | 23.7 | USEPA (2003) | No | No |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.000029 | LOQ | 3.43 | Modeled; USEPA (2018) | 0.000008 | No | 19.9 | USEPA (2003) | No | No |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.085 | | 0.085 | | mg/kg | SB-2B (4/17/2007) | 0.5 – 2 | 1/4 | 25% | 0.000047 – 0.000049 | 0.085 | MDC | 8.4 | USEPA (2018) | 0.01 | No | 0.02 | USEPA (2018) | Yes | **Yes** |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000027 – 0.000029 | 0.000029 | LOQ | 0.59 | USEPA (2018) | 0.00005 | No | 90 | USEPA (2018) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000035 – 0.000037 | 0.000037 | LOQ | 0.986 | Modeled; USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000016 | LOQ | 0.07 | USEPA (2018) | 0.0002 | No | 79 | USEPA (2018) | No | No |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000014 | 0.000014 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000019 – 0.00002 | 0.00002 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 0.15 | USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.000017 | LOQ | 0.25 | USEPA (2018) | 0.00007 | No | 3600 | USEPA (2018) | No | No |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.000017 | LOQ | 10 | USEPA (2018) | 0.000002 | No | 38 | USEPA (2018) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000025 | 0.000025 | LOQ | 0.22 | USEPA (2018) | 0.0001 | No | 0.011 | USEPA (2018) | No | No |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000031 – 0.000033 | 0.000033 | LOQ | 303 | USEPA (2018) | 1E-07 | No | 0.91 | USEPA (2018) | No | No |

**Table 2**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Western AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000014 | 0.000014 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000015 | 0.000015 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000021 – 0.000022 | 0.000022 | LOQ | 10 | USEPA (2018) | 0.000002 | No | 0.079 | USEPA (2018) | No | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000026 – 0.000028 | 0.000028 | LOQ | 0.001 | USEPA (2018) | 0.03 | No | 0.755 | USEPA (2018) | No | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | 0.024 | USEPA (2018) | 0.0008 | No | 0.6 | USEPA (2018) | No | No |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000024 | 0.000024 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000018 – 0.000019 | 0.000019 | LOQ | 3.61 | Modeled; USEPA (2018) | 0.000005 | No | 139 | USEPA (2003) | No | No |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000025 – 0.000027 | 0.000027 | LOQ | 2.2 | USEPA (2018) | 0.00001 | No | 4.8 | USEPA (2018) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000023 – 0.000025 | 0.000025 | LOQ | 1.69 | Modeled; USEPA (2018) | 0.00001 | No | 0.544 | USEPA (2003) | No | No |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000015 – 0.000016 | 0.000016 | LOQ | 20 | USEPA (2018) | 8E-07 | No | 0.545 | USEPA (2018) | No | No |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000041 – 0.000043 | 0.000043 | LOQ | 5 | USEPA (2018) | 0.000009 | No | 2.1 | USEPA (2018) | No | No |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000016 – 0.000017 | 0.000017 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000045 – 0.000048 | 0.000048 | LOQ | 0.79 | USEPA (2018) | 0.00006 | No | 37 | USEPA (2018) | No | No |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000013 – 0.000013 | 0.000013 | LOQ | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Total HMW PAHs | HMW-PAH | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | N/A | N/A | -- | 18 | USEPA (2008) | -- | -- | 1.1 | USEPA (2008) | No | No |
| Total LMW PAHs | LMW-PAH | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | N/A | N/A | -- | 29 | USEPA (2008) | -- | -- | 100 | USEPA (2008) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000035 – 0.00000037 | 0.00000037 | LOQ | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDE | 72-55-9 | 0.0016 | | 0.0016 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 1/4 | 25% | 0.00000036 – 0.00000039 | 0.0016 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000044 – 0.00000047 | 0.00000047 | LOQ | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000032 – 0.00000034 | 0.00000034 | LOQ | 0.03 | USEPA (2018) | 0.00001 | No | 0.037 | USEPA (2018) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000027 – 0.00000029 | 0.00000029 | LOQ | 0.0003 | USEPA (2018) | 0.001 | No | 59 | USEPA (2018) | No | No |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000042 | 0.00000042 | LOQ | 0.0029 | USEPA (2018) | 0.0001 | No | 0.27 | USEPA (2018) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000031 – 0.00000034 | 0.00000034 | LOQ | 0.0003 | USEPA (2018) | 0.001 | No | 0.27 | USEPA (2018) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000053 – 0.00000057 | 0.00000057 | LOQ | 0.0003 | USEPA (2018) | 0.002 | No | 0.27 | USEPA (2018) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000037 – 0.00000039 | 0.00000039 | LOQ | 0.0029 | USEPA (2018) | 0.0001 | No | 0.0049 | USEPA (2008) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000042 | 0.00000042 | LOQ | 0.0007 | USEPA (2018) | 0.0006 | No | 0.036 | USEPA (2018) | No | No |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000041 | 0.00000041 | LOQ | 0.0009 | USEPA (2018) | 0.0005 | No | 0.119 | USEPA (2018) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.00000041 | 0.00000041 | LOQ | 0.0009 | USEPA (2018) | 0.0005 | No | 0.119 | USEPA (2018) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000036 – 0.00000039 | 0.00000039 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000034 – 0.00000037 | 0.00000037 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.00000042 | 0.00000042 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000029 – 0.00000031 | 0.00000031 | LOQ | 0.0031 | USEPA (2018) | 0.0001 | No | 0.0095 | USEPA (2018) | No | No |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000039 – 0.00000042 | 0.00000042 | LOQ | 0.02 | USEPA (2018) | 0.00002 | No | 2.2 | USEPA (2018) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000038 – 0.0000004 | 0.0000004 | LOQ | 0.0016 | USEPA (2018) | 0.0003 | No | 0.059 | USEPA (2018) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000004 – 0.00000043 | 0.00000043 | LOQ | 0.00015 | USEPA (2018) | 0.003 | No | 0.152 | USEPA (2018) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00000048 – 0.00000051 | 0.00000051 | LOQ | 0.0021 | USEPA (2018) | 0.0002 | No | 5.1 | USEPA (2018) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000069 – 0.0000074 | 0.0000074 | LOQ | 0.00015 | USEPA (2018) | 0.05 | No | 4.1 | USEPA (2018) | No | No |
| Total DDD/DDE/DDT | TOT-DDT | 0.00160074 | | 0.00160074 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 1/4 | 25% | N/A | 0.00160074 | MDC | 4.05 | Modeled; USEPA (2018) | 0.0004 | No | 0.021 | USEPA (2008) | No | No |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000069 – 0.0000073 | 0.0000073 | LOQ | 0.33 | USEPA (2018) | 0.00002 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000022 – 0.000023 | 0.000023 | LOQ | 0.33 | USEPA (2018) | 0.00007 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00002 – 0.000021 | 0.000021 | LOQ | 0.33 | USEPA (2018) | 0.00006 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000011 – 0.000012 | 0.000012 | LOQ | 0.33 | USEPA (2018) | 0.00004 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000012 – 0.000013 | 0.000013 | LOQ | 0.33 | USEPA (2018) | 0.00004 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.000017 – 0.000018 | 0.000018 | LOQ | 0.33 | USEPA (2018) | 0.00005 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.0000073 – 0.0000077 | 0.0000077 | LOQ | 0.33 | USEPA (2018) | 0.00002 | No | 0.041 | USEPA (2018) | No | No |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.22 – 0.26 | 0.26 | LOQ | N/A | -- | -- | -- | 0.098 | USEPA (2018) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7010 | | 13300 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 13300 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |

**Table 2**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Western AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.78 – 0.85 | 0.85 | LOQ | 78 | USEPA (2008) | 0.01 | No | 0.27 | USEPA (2008) | Yes | No |
| Arsenic | 7440-38-2 | 1.7 | | 4.4 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 4.4 | MDC | 18 | USEPA (2008) | 0.2 | No | 43 | USEPA (2008) | No | No |
| Barium | 7440-39-3 | 16.7 | B | 32.4 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 32.4 | MDC | 330 | USEPA (2008) | 0.1 | No | 2000 | USEPA (2008) | No | No |
| Beryllium | 7440-41-7 | 0.17 | B | 0.25 | B | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 0.25 | MDC | 40 | USEPA (2008) | 0.006 | No | 21 | USEPA (2008) | No | No |
| Cadmium | 7440-43-9 | 0.17 | B | 0.24 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 2/4 | 50% | 0.15 – 0.16 | 0.24 | MDC | 32 | USEPA (2008) | 0.008 | No | 0.36 | USEPA (2008) | No | No |
| Calcium | 7440-70-2 | 285 | B | 657 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 657 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Chromium | 7440-47-3 | 6.5 | | 11.4 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 11.4 | MDC | 0.34 | USEPA (2018) | 30 | Yes | 26 | USEPA (2008) | No | No |
| Cobalt | 7440-48-4 | 1.6 | B | 4.3 | B | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 4.3 | MDC | 13 | USEPA (2008) | 0.3 | No | 120 | USEPA (2008) | No | No |
| Copper | 7440-50-8 | 3.5 | | 7.7 | | mg/kg | TP-8A (4/10/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 7.7 | MDC | 70 | USEPA (2008) | 0.1 | No | 28 | USEPA (2008) | No | No |
| Iron | 7439-89-6 | 4080 | | 10600 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 10600 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |
| Lead | 7439-92-1 | 3.2 | | 17.3 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 17.3 | MDC | 120 | USEPA (2008) | 0.1 | No | 11 | USEPA (2008) | Yes | Yes |
| Magnesium | 7439-95-4 | 335 | B | 926 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 926 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Manganese | 7439-96-5 | 48.8 | | 122 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 122 | MDC | 220 | USEPA (2008) | 0.6 | No | 4000 | USEPA (2008) | No | No |
| Mercury | 7439-97-6 | 0.013 | B | 0.077 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 0.077 | MDC | 0.05 | USEPA (2018) | 2 | Yes | 0.013 | USEPA (2018) | Yes | Yes |
| Nickel | 7440-02-0 | 4 | B | 6.9 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 6.9 | MDC | 38 | USEPA (2008) | 0.2 | No | 130 | USEPA (2008) | No | No |
| Potassium | 7440-09-7 | 254 | B | 518 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 518 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Selenium | 7782-49-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.82 – 0.89 | 0.89 | LOQ | 0.52 | USEPA (2008) | 2 | Yes | 0.63 | USEPA (2008) | Yes | No |
| Silver | 7440-22-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.16 – 0.18 | 0.18 | LOQ | 560 | USEPA (2008) | 0.0003 | No | 4.2 | USEPA (2008) | No | No |
| Sodium | 7440-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 82 – 89 | 89 | LOQ | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Thallium | 7440-28-0 | 0.029 | B | 0.079 | B | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 0.079 | MDC | 0.05 | USEPA (2018) | 2 | Yes | 0.42 | USEPA (2018) | No | No |
| Vanadium | 7440-62-2 | 7.9 | | 18.4 | | mg/kg | TP-8B (4/9/2007) | 0.5 – 2 | 4/4 | 100% | N/A | 18.4 | MDC | 60 | USEPA (2018) | 0.3 | No | 7.8 | USEPA (2008) | Yes | Yes |
| Zinc | 7440-66-6 | 8.5 | B | 20 | | mg/kg | SB-2A (4/17/2007) | 0 – 0.5 | 4/4 | 100% | N/A | 20 | MDC | 120 | USEPA (2008) | 0.2 | No | 46 | USEPA (2008) | No | No |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 3**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Central AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000055 – 0.000091 | 0.000091 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 260 | USEPA (2018) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000054 – 0.000088 | 0.000088 | LOQ | 0.19 | USEPA (2018) | 0.0005 | No | 0.127 | USEPA (2018) | No | No |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000005 – 0.000082 | 0.000082 | LOQ | 0.32 | USEPA (2018) | 0.0003 | No | 28.6 | USEPA (2018) | No | No |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000008 – 0.00013 | 0.00013 | LOQ | 8.54 | Modeled; USEPA (2018) | 0.00002 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000045 – 0.000074 | 0.000074 | LOQ | 0.14 | USEPA (2018) | 0.0005 | No | 210 | USEPA (2018) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000064 – 0.00011 | 0.00011 | LOQ | 0.04 | USEPA (2018) | 0.003 | No | 11 | USEPA (2018) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000033 – 0.000054 | 0.000054 | LOQ | 1.2 | USEPA (2018) | 0.00005 | No | 0.27 | USEPA (2018) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000002 – 0.00033 | 0.00033 | LOQ | 4.34 | Modeled; USEPA (2018) | 0.00008 | No | 0.0352 | USEPA (2003) | No | No |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000053 – 0.000087 | 0.000087 | LOQ | 4.58 | Modeled; USEPA (2018) | 0.00002 | No | 1.23 | USEPA (2003) | No | No |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.00007 | 0.00007 | LOQ | 0.09 | USEPA (2018) | 0.0008 | No | 0.92 | USEPA (2018) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000051 – 0.000083 | 0.000083 | LOQ | 0.4 | USEPA (2018) | 0.0002 | No | 0.85 | USEPA (2018) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.000085 | 0.000085 | LOQ | 0.28 | USEPA (2018) | 0.0003 | No | 32.7 | USEPA (2018) | No | No |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000046 – 0.000075 | 0.000075 | LOQ | 0.08 | USEPA (2018) | 0.0009 | No | 0.74 | USEPA (2018) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.000071 | 0.000071 | LOQ | 1.2 | USEPA (2018) | 0.00006 | No | 0.89 | USEPA (2018) | No | No |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000026 – 0.00042 | 0.00042 | LOQ | 1 | USEPA (2018) | 0.0004 | No | 350 | USEPA (2018) | No | No |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000013 – 0.00021 | 0.00021 | LOQ | 2.5 | USEPA (2018) | 0.00008 | No | 0.36 | USEPA (2018) | No | No |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000019 – 0.00031 | 0.00031 | LOQ | 5.19 | Modeled; USEPA (2018) | 0.00006 | No | 443 | USEPA (2003) | No | No |
| Acetone | 67-64-1 | 0.0378 | | 0.0378 | | mg/kg | TP-6A (4/10/2007) | 0 – 0.5 | 1/9 | 11% | 0.0000027 – 0.00044 | 0.0378 | MDC | 0.04 | USEPA (2018) | 0.9 | No | 1.2 | USEPA (2018) | No | No |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000045 – 0.000074 | 0.000074 | LOQ | 0.12 | USEPA (2018) | 0.0006 | No | 24 | USEPA (2018) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.00007 | 0.00007 | LOQ | 7.02 | Modeled; USEPA (2018) | 0.00001 | No | 0.54 | USEPA (2003) | No | No |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000041 – 0.000067 | 0.000067 | LOQ | 0.07 | USEPA (2018) | 0.001 | No | 15.9 | USEPA (2018) | No | No |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000035 – 0.000057 | 0.000057 | LOQ | 0.002 | USEPA (2018) | 0.03 | No | 0.24 | USEPA (2018) | No | No |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.000085 | 0.000085 | LOQ | 0.005 | USEPA (2018) | 0.02 | No | 0.81 | USEPA (2018) | No | No |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000089 – 0.00015 | 0.00015 | LOQ | 0.05 | USEPA (2018) | 0.003 | No | 2.98 | USEPA (2018) | No | No |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000041 – 0.000067 | 0.000067 | LOQ | 2.4 | USEPA (2018) | 0.00003 | No | 43 | USEPA (2018) | No | No |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000016 – 0.00027 | 0.00027 | LOQ | 2.77 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000054 – 0.000089 | 0.000089 | LOQ | 0.05 | USEPA (2018) | 0.002 | No | 8 | USEPA (2018) | No | No |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000043 – 0.000071 | 0.000071 | LOQ | 3.87 | Modeled; USEPA (2018) | 0.00002 | No | 10.4 | USEPA (2003) | No | No |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000063 – 0.0001 | 0.0001 | LOQ | 0.04 | USEPA (2018) | 0.003 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000039 – 0.000064 | 0.000064 | LOQ | 0.001 | USEPA (2018) | 0.06 | No | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000012 – 0.0002 | 0.0002 | LOQ | 1.46 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000051 – 0.000084 | 0.000084 | LOQ | 7.46 | Modeled; USEPA (2018) | 0.00001 | No | 2.05 | USEPA (2003) | No | No |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000074 – 0.00012 | 0.00012 | LOQ | 26.4 | Modeled; USEPA (2018) | 0.000005 | No | 39.5 | USEPA (2003) | No | No |
| Ethylbenzene | 100-41-4 | 0.00063 | J | 0.00063 | J | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 1/9 | 11% | 0.00000042 – 0.000069 | 0.00063 | MDC | 0.27 | USEPA (2018) | 0.002 | No | 5.16 | USEPA (2018) | No | No |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000023 – 0.00015 | 0.00015 | LOQ | 0.009 | USEPA (2018) | 0.02 | No | 0.04 | USEPA (2018) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000044 – 0.000071 | 0.000071 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | 0.0035 | | 0.0035 | | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 1/9 | 11% | 0.00000082 – 0.00013 | 0.0035 | MDC | 0.1 | USEPA (2018) | 0.04 | No | 1.4 | USEPA (2018) | No | No |
| Methyl acetate | 79-20-9 | 1.19 | | 1.19 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.0000013 – 0.00019 | 1.19 | MDC | 1.65 | Modeled; USEPA (2018) | 0.7 | No | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.000086 | 0.000086 | LOQ | 2.84 | Modeled; USEPA (2018) | 0.00003 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | 0.0025 | J | 0.0025 | J | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 1/9 | 11% | 0.0000006 – 0.000099 | 0.0025 | MDC | 1.87 | Modeled; USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000065 – 0.00011 | 0.00011 | LOQ | 0.21 | USEPA (2018) | 0.0005 | No | 2.6 | USEPA (2018) | No | No |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00002 – 0.00013 | 0.00013 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| o-Xylene | 95-47-6 | 0.0014 | | 0.0014 | | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 1/9 | 11% | 0.00000046 – 0.000076 | 0.0014 | MDC | 0.1 | USEPA (2018) | 0.01 | No | 1.4 | USEPA (2018) | No | No |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000031 – 0.00005 | 0.00005 | LOQ | 1.2 | USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000077 – 0.00013 | 0.00013 | LOQ | 0.06 | USEPA (2018) | 0.002 | No | 0.18 | USEPA (2018) | No | No |
| Toluene | 108-88-3 | 0.00096 | J | 0.00096 | J | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 1/9 | 11% | 0.00000051 – 0.000083 | 0.00096 | MDC | 0.15 | USEPA (2018) | 0.006 | No | 23 | USEPA (2018) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000064 – 0.0001 | 0.0001 | LOQ | 0.04 | USEPA (2018) | 0.003 | No | 0.784 | USEPA (2018) | No | No |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000037 – 0.00006 | 0.00006 | LOQ | 0.001 | USEPA (2018) | 0.06 | No | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000049 – 0.00008 | 0.00008 | LOQ | 0.06 | USEPA (2018) | 0.001 | No | 42 | USEPA (2018) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000068 – 0.00011 | 0.00011 | LOQ | 7.04 | Modeled; USEPA (2018) | 0.00002 | No | 16.4 | USEPA (2018) | No | No |

**Table 3**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Central AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000006 – 0.000099 | 0.000099 | LOQ | 0.03 | USEPA (2018) | 0.003 | No | 0.12 | USEPA (2018) | No | No |
| Xylene (total) | 1330-20-7 | 0.0049 | | 0.0049 | | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 1/9 | 11% | 0.00000046 – 0.000076 | 0.0049 | MDC | 0.1 | USEPA (2018) | 0.05 | No | 1.4 | USEPA (2018) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00011 | 0.00011 | LOQ | 0.2 | USEPA (2018) | 0.0006 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000052 – 0.00035 | 0.00035 | LOQ | 4 | USEPA (2018) | 0.00009 | No | 14.1 | USEPA (2018) | No | No |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000029 – 0.0002 | 0.0002 | LOQ | 10 | USEPA (2018) | 0.00002 | No | 9.94 | USEPA (2018) | No | No |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000058 – 0.00039 | 0.00039 | LOQ | 0.05 | USEPA (2018) | 0.008 | No | 87.5 | USEPA (2018) | No | No |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000089 – 0.0006 | 0.0006 | LOQ | 0.04 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000053 – 0.00036 | 0.00036 | LOQ | 0.15 | USEPA (2018) | 0.002 | No | 0.061 | USEPA (2018) | No | No |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00004 – 0.00027 | 0.00027 | LOQ | 6 | USEPA (2018) | 0.00005 | No | 14 | USEPA (2018) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00004 – 0.00027 | 0.00027 | LOQ | 30 | USEPA (2018) | 0.000009 | No | 4 | USEPA (2018) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000049 – 0.00033 | 0.00033 | LOQ | 8.18 | Modeled; USEPA (2018) | 0.00004 | No | 0.0122 | USEPA (2003) | No | No |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0002 | LOQ | 0.06 | USEPA (2018) | 0.003 | No | 0.39 | USEPA (2018) | No | No |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000023 – 0.00015 | 0.00015 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000034 – 0.00023 | 0.00023 | LOQ | 0.1 | USEPA (2018) | 0.002 | No | 580 | USEPA (2018) | No | No |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.00015 | LOQ | 0.02 | USEPA (2018) | 0.008 | No | 5.3 | USEPA (2018) | No | No |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000043 – 0.00029 | 0.00029 | LOQ | 7 | USEPA (2018) | 0.00004 | No | 5.12 | USEPA (2018) | No | No |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00005 – 0.00034 | 0.00034 | LOQ | 0.09 | USEPA (2018) | 0.004 | No | 3.49 | USEPA (2018) | No | No |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000033 – 0.00022 | 0.00022 | LOQ | 0.03 | USEPA (2018) | 0.007 | No | 0.646 | USEPA (2018) | No | No |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000027 – 0.00018 | 0.00018 | LOQ | 0.02 | USEPA (2018) | 0.009 | No | 5.3 | USEPA (2018) | No | No |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0002 | LOQ | 3.28 | Modeled; USEPA (2018) | 0.00006 | No | 0.144 | USEPA (2003) | No | No |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000018 – 0.00012 | 0.00012 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.0008 | No | N/A | -- | -- | -- |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000044 – 0.0003 | 0.0003 | LOQ | 2.37 | Modeled; USEPA (2018) | 0.0001 | No | 7.95 | USEPA (2003) | No | No |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.00015 | LOQ | 1 | USEPA (2018) | 0.0002 | No | 1.1 | USEPA (2018) | No | No |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000016 – 0.00011 | 0.00011 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.0007 | No | N/A | -- | -- | -- |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000024 – 0.00016 | 0.00016 | LOQ | 0.02 | USEPA (2018) | 0.008 | No | 5.3 | USEPA (2018) | No | No |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000047 – 0.00032 | 0.00032 | LOQ | 7 | USEPA (2018) | 0.00005 | No | 5.12 | USEPA (2018) | No | No |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000018 – 0.00012 | 0.00012 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acenaphthylene | 208-96-8 | 0.158 | J | 0.158 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.000014 – 0.000095 | 0.158 | MDC | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.00015 | LOQ | 6.35 | Modeled; USEPA (2018) | 0.00002 | No | 300 | USEPA (2003) | No | No |
| Anthracene | 120-12-7 | 0.222 | J | 0.267 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000013 – 0.000016 | 0.267 | MDC | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0002 | LOQ | 0.00005 | USEPA (2018) | 4 | Yes | N/A | -- | -- | -- |
| Benzaldehyde | 100-52-7 | 0.0542 | J | 0.0542 | J | mg/kg | TP-6A (4/10/2007) | 0 – 0.5 | 1/1 | 100% | N/A | 0.0542 | MDC | 0.0228 | Modeled; USEPA (2018) | 2 | Yes | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | 1.77 | | 2.49 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000017 – 0.00002 | 2.49 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(a)pyrene | 50-32-8 | 1.59 | | 1.91 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000014 | 1.91 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | 1.11 | | 1.39 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000016 – 0.000019 | 1.39 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | 1.01 | | 1.18 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000019 – 0.000022 | 1.18 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | 0.635 | | 1.03 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000026 – 0.000031 | 1.03 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.00015 | LOQ | 7.84 | Modeled; USEPA (2018) | 0.00002 | No | 0.302 | USEPA (2003) | No | No |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00012 | 0.00012 | LOQ | 6.44 | Modeled; USEPA (2018) | 0.00002 | No | 23.7 | USEPA (2003) | No | No |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000026 – 0.00018 | 0.00018 | LOQ | 3.43 | Modeled; USEPA (2018) | 0.00005 | No | 19.9 | USEPA (2003) | No | No |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0519 | J | 0.0519 | J | mg/kg | SB-4B (4/18/2007) | 0.5 – 2 | 1/9 | 11% | 0.000045 – 0.0003 | 0.0519 | MDC | 8.4 | USEPA (2018) | 0.006 | No | 0.02 | USEPA (2018) | Yes | Yes |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000026 – 0.00018 | 0.00018 | LOQ | 0.59 | USEPA (2018) | 0.0003 | No | 90 | USEPA (2018) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000034 – 0.00023 | 0.00023 | LOQ | 0.986 | Modeled; USEPA (2018) | 0.0002 | No | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000014 – 0.000095 | 0.000095 | LOQ | 0.07 | USEPA (2018) | 0.001 | No | 79 | USEPA (2018) | No | No |
| Chrysene | 218-01-9 | 2.81 | J | 4.04 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000013 – 0.000015 | 4.04 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | 0.388 | J | 0.388 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.000018 – 0.00012 | 0.388 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000016 – 0.00011 | 0.00011 | LOQ | 0.15 | USEPA (2018) | 0.0007 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000015 – 0.0001 | 0.0001 | LOQ | 0.25 | USEPA (2018) | 0.0004 | No | 3600 | USEPA (2018) | No | No |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000015 – 0.0001 | 0.0001 | LOQ | 10 | USEPA (2018) | 0.00001 | No | 38 | USEPA (2018) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.00015 | LOQ | 0.22 | USEPA (2018) | 0.0007 | No | 0.011 | USEPA (2018) | No | No |

**Table 3**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Central AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00003 – 0.0002 | 0.0002 | LOQ | 303 | USEPA (2018) | 7E-07 | No | 0.91 | USEPA (2018) | No | No |
| Fluoranthene | 206-44-0 | 1.5 | | 1.79 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000015 | 1.79 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000014 – 0.000094 | 0.000094 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00002 – 0.00014 | 0.00014 | LOQ | 10 | USEPA (2018) | 0.00001 | No | 0.079 | USEPA (2018) | No | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000025 – 0.00017 | 0.00017 | LOQ | 0.001 | USEPA (2018) | 0.2 | No | 0.755 | USEPA (2018) | No | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00012 | 0.00012 | LOQ | 0.024 | USEPA (2018) | 0.005 | No | 0.6 | USEPA (2018) | No | No |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.577 | | 0.617 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000022 – 0.000026 | 0.617 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.00012 | 0.00012 | LOQ | 3.61 | Modeled; USEPA (2018) | 0.00003 | No | 139 | USEPA (2003) | No | No |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000024 – 0.00016 | 0.00016 | LOQ | 2.2 | USEPA (2018) | 0.00007 | No | 4.8 | USEPA (2018) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000022 – 0.00015 | 0.00015 | LOQ | 1.69 | Modeled; USEPA (2018) | 0.00009 | No | 0.544 | USEPA (2003) | No | No |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000014 – 0.000097 | 0.000097 | LOQ | 20 | USEPA (2018) | 0.000005 | No | 0.545 | USEPA (2018) | No | No |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000039 – 0.00026 | 0.00026 | LOQ | 5 | USEPA (2018) | 0.00005 | No | 2.1 | USEPA (2018) | No | No |
| Phenanthrene | 85-01-8 | 1.47 | | 2.23 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000015 – 0.000018 | 2.23 | MDC | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000043 – 0.00029 | 0.00029 | LOQ | 0.79 | USEPA (2018) | 0.0004 | No | 37 | USEPA (2018) | No | No |
| Pyrene | 129-00-0 | 3.33 | | 4.74 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | 0.000012 – 0.000014 | 4.74 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Total HMW PAHs | HMW-PAH | 14.33 | | 19.58 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | N/A | 19.58 | MDC | 18 | USEPA (2008) | 1 | Yes | 1.1 | USEPA (2008) | Yes | Yes |
| Total LMW PAHs | LMW-PAH | 1.694 | | 2.653 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 2/9 | 22% | N/A | 2.653 | MDC | 29 | USEPA (2008) | 0.09 | No | 100 | USEPA (2008) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0019 | | 0.0113 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 4/9 | 44% | 0.00000034 – 0.00000037 | 0.0113 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDE | 72-55-9 | 0.002 | | 0.137 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 6/9 | 67% | 0.00000035 – 0.00000038 | 0.137 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDT | 50-29-3 | 0.0024 | J | 0.274 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 5/9 | 56% | 0.00000043 – 0.00000048 | 0.274 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000031 – 0.00000041 | 0.00000041 | LOQ | 0.03 | USEPA (2018) | 0.00001 | No | 0.037 | USEPA (2018) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000026 – 0.00000035 | 0.00000035 | LOQ | 0.0003 | USEPA (2018) | 0.001 | No | 59 | USEPA (2018) | No | No |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.00000051 | 0.00000051 | LOQ | 0.0029 | USEPA (2018) | 0.0002 | No | 0.27 | USEPA (2018) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000031 – 0.00000041 | 0.00000041 | LOQ | 0.0003 | USEPA (2018) | 0.001 | No | 0.27 | USEPA (2018) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000052 – 0.00000069 | 0.00000069 | LOQ | 0.0003 | USEPA (2018) | 0.002 | No | 0.27 | USEPA (2018) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000036 – 0.00000048 | 0.00000048 | LOQ | 0.0029 | USEPA (2018) | 0.0002 | No | 0.0049 | USEPA (2008) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.00000051 | 0.00000051 | LOQ | 0.0007 | USEPA (2018) | 0.0007 | No | 0.036 | USEPA (2018) | No | No |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.0000005 | 0.0000005 | LOQ | 0.0009 | USEPA (2018) | 0.0006 | No | 0.119 | USEPA (2018) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000037 – 0.0000005 | 0.0000005 | LOQ | 0.0009 | USEPA (2018) | 0.0006 | No | 0.119 | USEPA (2018) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000035 – 0.00000047 | 0.00000047 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000033 – 0.00000044 | 0.00000044 | LOQ | 0.0019 | USEPA (2018) | 0.0002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000039 – 0.00000052 | 0.00000052 | LOQ | 0.0019 | USEPA (2018) | 0.0003 | No | 0.0014 | USEPA (2018) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000028 – 0.00000038 | 0.00000038 | LOQ | 0.0031 | USEPA (2018) | 0.0001 | No | 0.0095 | USEPA (2018) | No | No |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000038 – 0.00000051 | 0.00000051 | LOQ | 0.02 | USEPA (2018) | 0.00003 | No | 2.2 | USEPA (2018) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000037 – 0.00000049 | 0.00000049 | LOQ | 0.0016 | USEPA (2018) | 0.0003 | No | 0.059 | USEPA (2018) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000039 – 0.00000052 | 0.00000052 | LOQ | 0.00015 | USEPA (2018) | 0.003 | No | 0.152 | USEPA (2018) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.00000047 – 0.00000063 | 0.00000063 | LOQ | 0.0021 | USEPA (2018) | 0.0003 | No | 5.1 | USEPA (2018) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000067 – 0.000009 | 0.000009 | LOQ | 0.00015 | USEPA (2018) | 0.06 | No | 4.1 | USEPA (2018) | No | No |
| Total DDD/DDE/DDT | TOT-DDT | 0.00200073 | | 0.423 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 5/9 | 56% | N/A | 0.423 | MDC | 4.05 | Modeled; USEPA (2018) | 0.1 | No | 0.021 | USEPA (2008) | Yes | Yes |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000067 – 0.0000089 | 0.0000089 | LOQ | 0.33 | USEPA (2018) | 0.00003 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000021 – 0.000028 | 0.000028 | LOQ | 0.33 | USEPA (2018) | 0.00008 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000019 – 0.000026 | 0.000026 | LOQ | 0.33 | USEPA (2018) | 0.00008 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000011 – 0.000015 | 0.000015 | LOQ | 0.33 | USEPA (2018) | 0.00005 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000012 – 0.000016 | 0.000016 | LOQ | 0.33 | USEPA (2018) | 0.00005 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.000017 – 0.000022 | 0.000022 | LOQ | 0.33 | USEPA (2018) | 0.00007 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.0000071 – 0.0000095 | 0.0000095 | LOQ | 0.33 | USEPA (2018) | 0.00003 | No | 0.041 | USEPA (2018) | No | No |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.23 – 0.31 | 0.31 | LOQ | N/A | -- | -- | -- | 0.098 | USEPA (2018) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |

**Table 3**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Central AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Aluminum | 7429-90-5 | 4600 | | 21100 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 21100 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/9 | 0% | 0.76 – 1.1 | 1.1 | LOQ | 78 | USEPA (2008) | 0.01 | No | 0.27 | USEPA (2008) | Yes | No |
| Arsenic | 7440-38-2 | 1.7 | | 4.8 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 4.8 | MDC | 18 | USEPA (2008) | 0.3 | No | 43 | USEPA (2008) | No | No |
| Barium | 7440-39-3 | 15.9 | B | 195 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 195 | MDC | 330 | USEPA (2008) | 0.6 | No | 2000 | USEPA (2008) | No | No |
| Beryllium | 7440-41-7 | 0.1 | B | 1.3 | | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 1.3 | MDC | 40 | USEPA (2008) | 0.03 | No | 21 | USEPA (2008) | No | No |
| Cadmium | 7440-43-9 | 0.23 | B | 0.76 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 3/9 | 33% | 0.15 – 0.17 | 0.76 | MDC | 32 | USEPA (2008) | 0.02 | No | 0.36 | USEPA (2008) | Yes | **Yes** |
| Calcium | 7440-70-2 | 282 | B | 71900 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 71900 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Chromium | 7440-47-3 | 5.3 | | 126 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 126 | MDC | 0.34 | USEPA (2018) | 400 | **Yes** | 26 | USEPA (2008) | Yes | **Yes** |
| Cobalt | 7440-48-4 | 1.5 | B | 28 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 28 | MDC | 13 | USEPA (2008) | 2 | **Yes** | 120 | USEPA (2008) | No | No |
| Copper | 7440-50-8 | 3 | | 10.7 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 10.7 | MDC | 70 | USEPA (2008) | 0.2 | No | 28 | USEPA (2008) | No | No |
| Iron | 7439-89-6 | 3520 | | 24800 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 24800 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |
| Lead | 7439-92-1 | 3.4 | | 121 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 121 | MDC | 120 | USEPA (2008) | 1 | **Yes** | 11 | USEPA (2008) | Yes | **Yes** |
| Magnesium | 7439-95-4 | 346 | B | 76700 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 76700 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Manganese | 7439-96-5 | 40.4 | | 372 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 372 | MDC | 220 | USEPA (2008) | 2 | **Yes** | 4000 | USEPA (2008) | No | No |
| Mercury | 7439-97-6 | 0.014 | B | 0.23 | | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 0.23 | MDC | 0.05 | USEPA (2018) | 5 | **Yes** | 0.013 | USEPA (2018) | Yes | **Yes** |
| Nickel | 7440-02-0 | 2.9 | B | 502 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 502 | MDC | 38 | USEPA (2008) | 10 | **Yes** | 130 | USEPA (2008) | Yes | **Yes** |
| Potassium | 7440-09-7 | 251 | B | 701 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 701 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Selenium | 7782-49-2 | 1.5 | B | 1.5 | B | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 1/9 | 11% | 0.79 – 0.97 | 1.5 | MDC | 0.52 | USEPA (2008) | 3 | **Yes** | 0.63 | USEPA (2008) | Yes | **Yes** |
| Silver | 7440-22-4 | 0.35 | B | 0.57 | B | mg/kg | SB-5A (4/18/2007) | 0 – 0.5 | 3/9 | 33% | 0.16 – 0.22 | 0.57 | MDC | 560 | USEPA (2008) | 0.001 | No | 4.2 | USEPA (2008) | No | No |
| Sodium | 7440-23-5 | 84.3 | B | 115 | B | mg/kg | SB-5A (4/18/2007) | 0 – 0.5 | 3/9 | 33% | 83 – 110 | 115 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Thallium | 7440-28-0 | 0.03 | B | 0.2 | B | mg/kg | TP-1A (BURN AREA) (4/9/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 0.2 | MDC | 0.05 | USEPA (2018) | 4 | **Yes** | 0.42 | USEPA (2018) | No | No |
| Vanadium | 7440-62-2 | 7 | | 32.5 | | mg/kg | TP-6B (4/10/2007) | 0.5 – 2 | 9/9 | 100% | N/A | 32.5 | MDC | 60 | USEPA (2018) | 0.5 | No | 7.8 | USEPA (2008) | Yes | **Yes** |
| Zinc | 7440-66-6 | 7.4 | | 146 | J | mg/kg | SB-4A (4/18/2007) | 0 – 0.5 | 9/9 | 100% | N/A | 146 | MDC | 120 | USEPA (2008) | 1 | **Yes** | 46 | USEPA (2008) | Yes | **Yes** |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 4**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Southern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? [2] |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000048 – 0.000082 | 0.000082 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 260 | USEPA (2018) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000046 – 0.00008 | 0.00008 | LOQ | 0.19 | USEPA (2018) | 0.0004 | No | 0.127 | USEPA (2018) | No | No |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000043 – 0.000074 | 0.000074 | LOQ | 0.32 | USEPA (2018) | 0.0002 | No | 28.6 | USEPA (2018) | No | No |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000069 – 0.00012 | 0.00012 | LOQ | 8.54 | Modeled; USEPA (2018) | 0.00001 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000039 – 0.000067 | 0.000067 | LOQ | 0.14 | USEPA (2018) | 0.0005 | No | 210 | USEPA (2018) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000055 – 0.000095 | 0.000095 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 11 | USEPA (2018) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000028 – 0.000049 | 0.000049 | LOQ | 1.2 | USEPA (2018) | 0.00004 | No | 0.27 | USEPA (2018) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000017 – 0.0003 | 0.0003 | LOQ | 4.34 | Modeled; USEPA (2018) | 0.00007 | No | 0.0352 | USEPA (2003) | No | No |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000046 – 0.000079 | 0.000079 | LOQ | 4.58 | Modeled; USEPA (2018) | 0.00002 | No | 1.23 | USEPA (2003) | No | No |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000063 | 0.000063 | LOQ | 0.09 | USEPA (2018) | 0.0007 | No | 0.92 | USEPA (2018) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000044 – 0.000075 | 0.000075 | LOQ | 0.4 | USEPA (2018) | 0.0002 | No | 0.85 | USEPA (2018) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000045 – 0.000077 | 0.000077 | LOQ | 0.28 | USEPA (2018) | 0.0003 | No | 32.7 | USEPA (2018) | No | No |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000039 – 0.000068 | 0.000068 | LOQ | 0.08 | USEPA (2018) | 0.0009 | No | 0.74 | USEPA (2018) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000064 | 0.000064 | LOQ | 1.2 | USEPA (2018) | 0.00005 | No | 0.89 | USEPA (2018) | No | No |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000022 – 0.00038 | 0.00038 | LOQ | 1 | USEPA (2018) | 0.0004 | No | 350 | USEPA (2018) | No | No |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000011 – 0.00019 | 0.00019 | LOQ | 2.5 | USEPA (2018) | 0.00008 | No | 0.36 | USEPA (2018) | No | No |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000016 – 0.00028 | 0.00028 | LOQ | 5.19 | Modeled; USEPA (2018) | 0.00005 | No | 443 | USEPA (2003) | No | No |
| Acetone | 67-64-1 | 0.012 | J | 0.012 | J | mg/kg | TP22B (6/5/2015) | 1.5 – 2 | 1/14 | 7% | 0.0000023 – 0.0004 | 0.012 | MDC | 0.04 | USEPA (2018) | 0.3 | No | 1.2 | USEPA (2018) | No | No |
| Benzene | 71-43-2 | 0.0014 | J | 0.0014 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 1/14 | 7% | 0.00000039 – 0.000067 | 0.0014 | MDC | 0.12 | USEPA (2018) | 0.01 | No | 24 | USEPA (2018) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000063 | 0.000063 | LOQ | 7.02 | Modeled; USEPA (2018) | 0.000009 | No | 0.54 | USEPA (2003) | No | No |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000035 – 0.00006 | 0.00006 | LOQ | 0.07 | USEPA (2018) | 0.0009 | No | 15.9 | USEPA (2018) | No | No |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000003 – 0.000051 | 0.000051 | LOQ | 0.002 | USEPA (2018) | 0.03 | No | 0.24 | USEPA (2018) | No | No |
| Carbon disulfide | 75-15-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000045 – 0.000077 | 0.000077 | LOQ | 0.005 | USEPA (2018) | 0.02 | No | 0.81 | USEPA (2018) | No | No |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000077 – 0.00013 | 0.00013 | LOQ | 0.05 | USEPA (2018) | 0.003 | No | 2.98 | USEPA (2018) | No | No |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000035 – 0.00006 | 0.00006 | LOQ | 2.4 | USEPA (2018) | 0.00003 | No | 43 | USEPA (2018) | No | No |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000014 – 0.00024 | 0.00024 | LOQ | 2.77 | Modeled; USEPA (2018) | 0.00009 | No | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000047 – 0.000081 | 0.000081 | LOQ | 0.05 | USEPA (2018) | 0.002 | No | 8 | USEPA (2018) | No | No |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000064 | 0.000064 | LOQ | 3.87 | Modeled; USEPA (2018) | 0.00002 | No | 10.4 | USEPA (2003) | No | No |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000054 – 0.000093 | 0.000093 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000033 – 0.000058 | 0.000058 | LOQ | 0.001 | USEPA (2018) | 0.06 | No | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000001 – 0.00018 | 0.00018 | LOQ | 1.46 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000044 – 0.000076 | 0.000076 | LOQ | 7.46 | Modeled; USEPA (2018) | 0.00001 | No | 2.05 | USEPA (2003) | No | No |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000064 – 0.00011 | 0.00011 | LOQ | 26.4 | Modeled; USEPA (2018) | 0.000004 | No | 39.5 | USEPA (2003) | No | No |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000036 – 0.000063 | 0.000063 | LOQ | 0.27 | USEPA (2018) | 0.0002 | No | 5.16 | USEPA (2018) | No | No |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000024 – 0.00018 | 0.00018 | LOQ | 0.009 | USEPA (2018) | 0.02 | No | 0.04 | USEPA (2018) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000037 – 0.000065 | 0.000065 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000071 – 0.00012 | 0.00012 | LOQ | 0.1 | USEPA (2018) | 0.001 | No | 1.4 | USEPA (2018) | No | No |
| Methyl acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000011 – 0.0002 | 0.0002 | LOQ | 1.65 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000045 – 0.000078 | 0.000078 | LOQ | 2.84 | Modeled; USEPA (2018) | 0.00003 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000052 – 0.00009 | 0.00009 | LOQ | 1.87 | Modeled; USEPA (2018) | 0.00005 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000056 – 0.000096 | 0.000096 | LOQ | 0.21 | USEPA (2018) | 0.0005 | No | 2.6 | USEPA (2018) | No | No |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.000025 | 0.000025 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000004 – 0.000069 | 0.000069 | LOQ | 0.1 | USEPA (2018) | 0.0007 | No | 1.4 | USEPA (2018) | No | No |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000026 – 0.000045 | 0.000045 | LOQ | 1.2 | USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | 0.00099 | J | 0.0028 | J | mg/kg | TP-3B (BURN AREA) (4/9/2007) | 0.5 – 2 | 2/14 | 14% | 0.00000072 – 0.00011 | 0.0028 | MDC | 0.06 | USEPA (2018) | 0.05 | No | 0.18 | USEPA (2018) | No | No |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000044 – 0.000075 | 0.000075 | LOQ | 0.15 | USEPA (2018) | 0.0005 | No | 23 | USEPA (2018) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000055 – 0.000095 | 0.000095 | LOQ | 0.04 | USEPA (2018) | 0.002 | No | 0.784 | USEPA (2018) | No | No |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000032 – 0.000054 | 0.000054 | LOQ | 0.001 | USEPA (2018) | 0.05 | No | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000042 – 0.000072 | 0.000072 | LOQ | 0.06 | USEPA (2018) | 0.001 | No | 42 | USEPA (2018) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000059 – 0.0001 | 0.0001 | LOQ | 7.04 | Modeled; USEPA (2018) | 0.00001 | No | 16.4 | USEPA (2018) | No | No |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00000052 – 0.00009 | 0.00009 | LOQ | 0.03 | USEPA (2018) | 0.003 | No | 0.12 | USEPA (2018) | No | No |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.0000004 – 0.000069 | 0.000069 | LOQ | 0.1 | USEPA (2018) | 0.0007 | No | 1.4 | USEPA (2018) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |

**Table 4**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Southern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? [2] |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00018 | LOQ | 0.2 | USEPA (2018) | 0.0009 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000055 – 0.00018 | 0.00018 | LOQ | 4 | USEPA (2018) | 0.00005 | No | 14.1 | USEPA (2018) | No | No |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000031 – 0.00018 | 0.00018 | LOQ | 10 | USEPA (2018) | 0.00002 | No | 9.94 | USEPA (2018) | No | No |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000061 – 0.00018 | 0.00018 | LOQ | 0.05 | USEPA (2018) | 0.004 | No | 87.5 | USEPA (2018) | No | No |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000094 – 0.00018 | 0.00018 | LOQ | 0.04 | USEPA (2018) | 0.005 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000056 – 0.00089 | 0.00089 | LOQ | 0.15 | USEPA (2018) | 0.006 | No | 0.061 | USEPA (2018) | No | No |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000042 – 0.00018 | 0.00018 | LOQ | 6 | USEPA (2018) | 0.00003 | No | 14 | USEPA (2018) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000042 – 0.00018 | 0.00018 | LOQ | 30 | USEPA (2018) | 0.000006 | No | 4 | USEPA (2018) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000051 – 0.00018 | 0.00018 | LOQ | 8.18 | Modeled; USEPA (2018) | 0.00002 | No | 0.0122 | USEPA (2003) | No | No |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000031 – 0.00018 | 0.00018 | LOQ | 0.06 | USEPA (2018) | 0.003 | No | 0.39 | USEPA (2018) | No | No |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.000029 | 0.000029 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000036 – 0.00018 | 0.00018 | LOQ | 0.1 | USEPA (2018) | 0.002 | No | 580 | USEPA (2018) | No | No |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00018 | LOQ | 0.02 | USEPA (2018) | 0.009 | No | 5.3 | USEPA (2018) | No | No |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000045 – 0.00018 | 0.00018 | LOQ | 7 | USEPA (2018) | 0.00003 | No | 5.12 | USEPA (2018) | No | No |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000052 – 0.00018 | 0.00018 | LOQ | 0.09 | USEPA (2018) | 0.002 | No | 3.49 | USEPA (2018) | No | No |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000035 – 0.00022 | 0.00022 | LOQ | 0.03 | USEPA (2018) | 0.007 | No | 0.646 | USEPA (2018) | No | No |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000028 – 0.00018 | 0.00018 | LOQ | 0.02 | USEPA (2018) | 0.009 | No | 5.3 | USEPA (2018) | No | No |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000032 – 0.00089 | 0.00089 | LOQ | 3.28 | Modeled; USEPA (2018) | 0.0003 | No | 0.144 | USEPA (2003) | No | No |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000019 – 0.00018 | 0.00018 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000046 – 0.00018 | 0.00018 | LOQ | 2.37 | Modeled; USEPA (2018) | 0.00008 | No | 7.95 | USEPA (2003) | No | No |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00018 | LOQ | 1 | USEPA (2018) | 0.0002 | No | 1.1 | USEPA (2018) | No | No |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.00018 | 0.00018 | LOQ | 0.15 | Modeled; USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000025 – 0.00018 | 0.00018 | LOQ | 0.02 | USEPA (2018) | 0.009 | No | 5.3 | USEPA (2018) | No | No |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.00005 – 0.00089 | 0.00089 | LOQ | 7 | USEPA (2018) | 0.0001 | No | 5.12 | USEPA (2018) | No | No |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.000023 | 0.000023 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.00012 | 0.00012 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00018 | LOQ | 6.35 | Modeled; USEPA (2018) | 0.00003 | No | 300 | USEPA (2003) | No | No |
| Anthracene | 120-12-7 | 0.0168 | J | 0.0222 | J | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 3/14 | 21% | 0.000014 – 0.000022 | 0.0222 | MDC | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000032 – 0.00018 | 0.00018 | LOQ | 0.00005 | USEPA (2018) | 4 | **Yes** | N/A | -- | -- | -- |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/4 | 0% | 0.00013 – 0.00018 | 0.00018 | LOQ | 0.0228 | Modeled; USEPA (2018) | 0.008 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | 0.017 | J | 0.114 | | mg/kg | Multiple Locations | N/A | 6/14 | 43% | 0.000017 – 0.000022 | 0.114 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(a)pyrene | 50-32-8 | 0.01 | J | 0.117 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 4/14 | 29% | 0.000013 – 0.000022 | 0.117 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | 0.015 | J | 0.133 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 4/14 | 29% | 0.000017 – 0.000022 | 0.133 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | 0.01 | J | 0.085 | J | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 6/14 | 43% | 0.00002 – 0.000025 | 0.085 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | 0.0857 | | 0.107 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 3/14 | 21% | 0.000017 – 0.000034 | 0.107 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000024 – 0.00018 | 0.00018 | LOQ | 7.84 | Modeled; USEPA (2018) | 0.00002 | No | 0.302 | USEPA (2003) | No | No |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00018 | LOQ | 6.44 | Modeled; USEPA (2018) | 0.00003 | No | 23.7 | USEPA (2003) | No | No |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000027 – 0.00018 | 0.00018 | LOQ | 3.43 | Modeled; USEPA (2018) | 0.00005 | No | 19.9 | USEPA (2003) | No | No |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.0525 | J | 0.199 | | mg/kg | TP-4B (BURN AREA) (4/9/2007) | 0.5 – 2 | 5/14 | 36% | 0.000047 – 0.00016 | 0.199 | MDC | 8.4 | USEPA (2018) | 0.02 | No | 0.02 | USEPA (2018) | Yes | **Yes** |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000028 – 0.00018 | 0.00018 | LOQ | 0.59 | USEPA (2018) | 0.0003 | No | 90 | USEPA (2018) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000035 – 0.00018 | 0.00018 | LOQ | 0.986 | Modeled; USEPA (2018) | 0.0002 | No | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.00018 | 0.00018 | LOQ | 0.07 | USEPA (2018) | 0.003 | No | 79 | USEPA (2018) | No | No |
| Chrysene | 218-01-9 | 0.0191 | J | 0.117 | | mg/kg | Multiple Locations | N/A | 5/14 | 36% | 0.000014 – 0.00002 | 0.117 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | 0.0226 | J | 0.024 | J | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 2/14 | 14% | 0.000017 – 0.000024 | 0.024 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000017 – 0.00018 | 0.00018 | LOQ | 0.15 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000016 – 0.00018 | 0.00018 | LOQ | 0.25 | USEPA (2018) | 0.0007 | No | 3600 | USEPA (2018) | No | No |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000016 – 0.00018 | 0.00018 | LOQ | 10 | USEPA (2018) | 0.00002 | No | 38 | USEPA (2018) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00018 | LOQ | 0.22 | USEPA (2018) | 0.0008 | No | 0.011 | USEPA (2018) | No | No |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000031 – 0.00018 | 0.00018 | LOQ | 303 | USEPA (2018) | 6E-07 | No | 0.91 | USEPA (2018) | No | No |
| Fluoranthene | 206-44-0 | 0.023 | J | 0.176 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 7/14 | 50% | 0.000013 – 0.00002 | 0.176 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.000022 | 0.000022 | LOQ | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000021 – 0.00018 | 0.00018 | LOQ | 10 | USEPA (2018) | 0.00002 | No | 0.079 | USEPA (2018) | No | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000026 – 0.00089 | 0.00089 | LOQ | 0.001 | USEPA (2018) | 0.9 | No | 0.755 | USEPA (2018) | No | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00018 | LOQ | 0.024 | USEPA (2018) | 0.008 | No | 0.6 | USEPA (2018) | No | No |

**Table 4**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Southern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? [2] |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 0.0613 | J | 0.0643 | J | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 3/14 | 21% | 0.000017 – 0.000029 | 0.0643 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000018 – 0.00018 | 0.00018 | LOQ | 3.61 | Modeled; USEPA (2018) | 0.00005 | No | 139 | USEPA (2003) | No | No |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000026 – 0.00018 | 0.00018 | LOQ | 2.2 | USEPA (2018) | 0.00008 | No | 4.8 | USEPA (2018) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000023 – 0.00018 | 0.00018 | LOQ | 1.69 | Modeled; USEPA (2018) | 0.0001 | No | 0.544 | USEPA (2003) | No | No |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000015 – 0.00018 | 0.00018 | LOQ | 20 | USEPA (2018) | 0.000009 | No | 0.545 | USEPA (2018) | No | No |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000041 – 0.00036 | 0.00036 | LOQ | 5 | USEPA (2018) | 0.00007 | No | 2.1 | USEPA (2018) | No | No |
| Phenanthrene | 85-01-8 | 0.0256 | J | 0.0831 | | mg/kg | TP-7A (BURN AREA) (4/10/2007) | 0 – 0.5 | 4/14 | 29% | 0.000016 – 0.000022 | 0.0831 | MDC | See LMW PAHs | USEPA (2008) | -- | -- | See LMW PAHs | USEPA (2008) | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/14 | 0% | 0.000045 – 0.00018 | 0.00018 | LOQ | 0.79 | USEPA (2018) | 0.0002 | No | 37 | USEPA (2018) | No | No |
| Pyrene | 129-00-0 | 0.0213 | J | 0.159 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 7/14 | 50% | 0.000013 – 0.00002 | 0.159 | MDC | See HMW PAHs | USEPA (2008) | -- | -- | See HMW PAHs | USEPA (2008) | -- | -- |
| Total HMW PAHs | HMW-PAH | 0.00034 | | 1.01 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 10/14 | 71% | N/A | 1.01 | MDC | 18 | USEPA (2008) | 0.06 | No | 1.1 | USEPA (2008) | No | No |
| Total LMW PAHs | LMW-PAH | 0.000203 | | 0.1001 | | mg/kg | TP-7A (BURN AREA) (4/10/2007) | 0 – 0.5 | 5/14 | 36% | N/A | 0.1001 | MDC | 29 | USEPA (2008) | 0.003 | No | 100 | USEPA (2008) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.0013 | J | 0.197 | | mg/kg | TP-4B (BURN AREA) (4/9/2007) | 0.5 – 2 | 7/10 | 70% | 0.00000035 – 0.00000043 | 0.197 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDE | 72-55-9 | 0.0053 | | 1.31 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 9/10 | 90% | 0.00000037 – 0.00000037 | 1.31 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| 4,4'-DDT | 50-29-3 | 0.0063 | | 0.577 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 9/10 | 90% | 0.00000045 – 0.00000045 | 0.577 | MDC | See Total | USEPA (2008) | -- | -- | See Total | USEPA (2008) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000032 – 0.0000036 | 0.0000036 | LOQ | 0.03 | USEPA (2018) | 0.0001 | No | 0.037 | USEPA (2018) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000027 – 0.000003 | 0.000003 | LOQ | 0.0003 | USEPA (2018) | 0.01 | No | 59 | USEPA (2018) | No | No |
| alpha-Chlordane | 5103-71-9 | 0.0267 | | 0.0267 | | mg/kg | TP-3B (BURN AREA) (4/9/2007) | 0.5 – 2 | 1/10 | 10% | 0.0000004 – 0.0000044 | 0.0267 | MDC | 0.0029 | USEPA (2018) | 9 | Yes | 0.27 | USEPA (2018) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000032 – 0.0000035 | 0.0000035 | LOQ | 0.0003 | USEPA (2018) | 0.01 | No | 0.27 | USEPA (2018) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000054 – 0.000006 | 0.000006 | LOQ | 0.0003 | USEPA (2018) | 0.02 | No | 0.27 | USEPA (2018) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000037 – 0.0000041 | 0.0000041 | LOQ | 0.0029 | USEPA (2018) | 0.001 | No | 0.0049 | USEPA (2008) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000004 – 0.0000044 | 0.0000044 | LOQ | 0.0007 | USEPA (2018) | 0.006 | No | 0.036 | USEPA (2018) | No | No |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000039 – 0.0000044 | 0.0000044 | LOQ | 0.0009 | USEPA (2018) | 0.005 | No | 0.119 | USEPA (2018) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000039 – 0.0000043 | 0.0000043 | LOQ | 0.0009 | USEPA (2018) | 0.005 | No | 0.119 | USEPA (2018) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000037 – 0.000004 | 0.000004 | LOQ | 0.0019 | USEPA (2018) | 0.002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000035 – 0.0000038 | 0.0000038 | LOQ | 0.0019 | USEPA (2018) | 0.002 | No | 0.0014 | USEPA (2018) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000004 – 0.0000045 | 0.0000045 | LOQ | 0.0019 | USEPA (2018) | 0.002 | No | 0.0014 | USEPA (2018) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000003 – 0.0000033 | 0.0000033 | LOQ | 0.0031 | USEPA (2018) | 0.001 | No | 0.0095 | USEPA (2018) | No | No |
| gamma-Chlordane | 5103-74-2 | 0.0346 | | 0.0346 | | mg/kg | TP-3B (BURN AREA) (4/9/2007) | 0.5 – 2 | 1/10 | 10% | 0.0000004 – 0.0000044 | 0.0346 | MDC | 0.02 | USEPA (2018) | 2 | Yes | 2.2 | USEPA (2018) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000038 – 0.0000042 | 0.0000042 | LOQ | 0.0016 | USEPA (2018) | 0.003 | No | 0.059 | USEPA (2018) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000041 – 0.0000045 | 0.0000045 | LOQ | 0.00015 | USEPA (2018) | 0.03 | No | 0.152 | USEPA (2018) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00000049 – 0.0000054 | 0.0000054 | LOQ | 0.0021 | USEPA (2018) | 0.003 | No | 5.1 | USEPA (2018) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000007 – 0.000077 | 0.000077 | LOQ | 0.00015 | USEPA (2018) | 0.5 | No | 4.1 | USEPA (2018) | No | No |
| Total DDD/DDE/DDT | TOT-DDT | 0.01161 | | 2.061 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 9/10 | 90% | N/A | 2.061 | MDC | 4.05 | Modeled; USEPA (2018) | 0.5 | No | 0.021 | USEPA (2008) | Yes | Yes |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.0000069 – 0.0000084 | 0.0000084 | LOQ | 0.33 | USEPA (2018) | 0.00003 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000022 – 0.000027 | 0.000027 | LOQ | 0.33 | USEPA (2018) | 0.00008 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.00002 – 0.000024 | 0.000024 | LOQ | 0.33 | USEPA (2018) | 0.00007 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000012 – 0.000014 | 0.000014 | LOQ | 0.33 | USEPA (2018) | 0.00004 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000013 – 0.000015 | 0.000015 | LOQ | 0.33 | USEPA (2018) | 0.00005 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.000017 – 0.000021 | 0.000021 | LOQ | 0.33 | USEPA (2018) | 0.00006 | No | 0.041 | USEPA (2018) | No | No |
| Aroclor 1260 | 11096-82-5 | 0.213 | | 0.213 | | mg/kg | TP-3B (BURN AREA) (4/9/2007) | 0.5 – 2 | 1/10 | 10% | 0.0000074 – 0.000009 | 0.213 | MDC | 0.33 | USEPA (2018) | 0.6 | No | 0.041 | USEPA (2018) | Yes | Yes |
| **Dioxins and Furans** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.000208 | | 0.000289 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.000289 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.0000412 | J | 0.0000454 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000454 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | 0.0000033 | J | 0.00000332 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000332 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | 0.0000046 | | 0.00000571 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000571 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | 0.00001 | | 0.0000108 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000108 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000975 | | 0.0000129 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000129 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | 0.00000948 | | 0.00000964 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000964 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.00000883 | | 0.0000116 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000116 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | 0.00000279 | J | 0.0000028 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000028 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | 0.00000721 | | 0.0000079 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000079 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | 0.00000446 | | 0.00000516 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000516 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |

**Table 4**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Southern AOC; Surface Soil, 0 - 2 feet)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Soil
**Exposure Medium:** Soil
**Exposure Point:** Soil (0 – 2 ft)

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) ESV | Direct Contact (DC) Source | Direct Contact (DC) HQ | Direct Contact (DC) COPEC | Wildlife (WL) ESV | Wildlife (WL) Source | EPC Exceed ESV? | Proceed to DRM? [2] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | 0.0000128 | | 0.000013 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.000013 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 2,3,4,7,8-PECDF | 57117-31-4 | 0.0000137 | | 0.0000139 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000139 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 2,3,7,8-TCDD | 1746-01-6 | 0.0000012 | | 0.00000138 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.00000138 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.0000127 | | 0.0000141 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000141 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| OCDD | 3268-87-9 | 0.00895 | J | 0.0126 | J | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0126 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| OCDF | 39001-02-0 | 0.000022 | | 0.0000241 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 0.0000241 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| Total TEQ (Bird) | TEQ-BIRD | 0.000040613 | | 4.10023E-05 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 4.1002E-05 | MDC | 5 | USEPA (2018) | 0.000008 | No | 0.00000315 | USEPA (2018) | Yes | **Yes** |
| Total TEQ (Mammal) | TEQ-MAMMAL | 2.25539E-05 | | 2.59097E-05 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 2/2 | 100% | N/A | 2.591E-05 | MDC | 5 | USEPA (2018) | 0.000005 | No | 0.00000315 | USEPA (2018) | Yes | **Yes** |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/10 | 0% | 0.23 – 0.32 | 0.32 | LOQ | N/A | -- | -- | -- | 0.098 | USEPA (2018) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7060 | | 38600 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 14/14 | 100% | N/A | 38600 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |
| Antimony | 7440-36-0 | 2.8 | J | 63.7 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 9/14 | 64% | 0.82 – 0.97 | 63.7 | MDC | 78 | USEPA (2008) | 0.8 | No | 0.27 | USEPA (2008) | Yes | **Yes** |
| Arsenic | 7440-38-2 | 3 | | 8.4 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 8.4 | MDC | 18 | USEPA (2008) | 0.5 | No | 43 | USEPA (2008) | No | No |
| Barium | 7440-39-3 | 32.2 | | 1160 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 1160 | MDC | 330 | USEPA (2008) | 4 | **Yes** | 2000 | USEPA (2008) | No | No |
| Beryllium | 7440-41-7 | 0.086 | B | 0.4 | B | mg/kg | SB-3B (4/18/2007) | 0.5 – 2 | 9/14 | 64% | 0.022 – 0.14 | 0.4 | MDC | 40 | USEPA (2008) | 0.01 | No | 21 | USEPA (2008) | No | No |
| Cadmium | 7440-43-9 | 0.21 | B | 21.6 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 13/14 | 93% | 0.16 – 0.16 | 21.6 | MDC | 32 | USEPA (2008) | 0.7 | No | 0.36 | USEPA (2008) | Yes | **Yes** |
| Calcium | 7440-70-2 | 234 | B | 12700 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 12700 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Chromium | 7440-47-3 | 8 | | 616 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 14/14 | 100% | N/A | 616 | MDC | 0.34 | USEPA (2018) | 2000 | **Yes** | 26 | USEPA (2008) | Yes | **Yes** |
| Cobalt | 7440-48-4 | 2.5 | B | 15 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 15 | MDC | 13 | USEPA (2008) | 1 | **Yes** | 120 | USEPA (2008) | No | No |
| Copper | 7440-50-8 | 5.3 | | 5100 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 14/14 | 100% | N/A | 5100 | MDC | 70 | USEPA (2008) | 70 | **Yes** | 28 | USEPA (2008) | Yes | **Yes** |
| Iron | 7439-89-6 | 5970 | | 160000 | | mg/kg | TP27A (5/10/2016) | 1.5 – 1.5 | 14/14 | 100% | N/A | 160000 | MDC | See Text - pH | USEPA (2008) | -- | -- | See Text - pH | USEPA (2008) | -- | -- |
| Lead | 7439-92-1 | 5.4 | | 2120 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 2120 | MDC | 120 | USEPA (2008) | 20 | **Yes** | 11 | USEPA (2008) | Yes | **Yes** |
| Magnesium | 7439-95-4 | 699 | | 2580 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 14/14 | 100% | N/A | 2580 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Manganese | 7439-96-5 | 148 | | 1490 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 1490 | MDC | 220 | USEPA (2008) | 7 | **Yes** | 4000 | USEPA (2008) | No | No |
| Mercury | 7439-97-6 | 0.04 | | 1.8 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 1.8 | MDC | 0.05 | USEPA (2018) | 40 | **Yes** | 0.013 | USEPA (2018) | Yes | **Yes** |
| Nickel | 7440-02-0 | 4.8 | | 132 | | mg/kg | TP-7B (BURN AREA) (4/10/2007) | 0.5 – 2 | 14/14 | 100% | N/A | 132 | MDC | 38 | USEPA (2008) | 3 | **Yes** | 130 | USEPA (2008) | Yes | **Yes** |
| Potassium | 7440-09-7 | 292 | B | 1410 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 1410 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Selenium | 7782-49-2 | 0.93 | B | 4.4 | B | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 2/14 | 14% | 0.76 – 1 | 4.4 | MDC | 0.52 | USEPA (2008) | 8 | **Yes** | 0.63 | USEPA (2008) | Yes | **Yes** |
| Silver | 7440-22-4 | 0.18 | B | 84.5 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 10/14 | 71% | 0.17 – 0.3 | 84.5 | MDC | 560 | USEPA (2008) | 0.2 | No | 4.2 | USEPA (2008) | Yes | **Yes** |
| Sodium | 7440-23-5 | 63 | J | 215 | B | mg/kg | TP-3B (BURN AREA) (4/9/2007) | 0.5 – 2 | 7/14 | 50% | 85 – 190 | 215 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Thallium | 7440-28-0 | 0.045 | B | 0.15 | B | mg/kg | SB-3B (4/18/2007) | 0.5 – 2 | 5/14 | 36% | 0.043 – 1.6 | 0.15 | MDC | 0.05 | USEPA (2018) | 3 | **Yes** | 0.42 | USEPA (2018) | No | No |
| Vanadium | 7440-62-2 | 11 | | 51 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 51 | MDC | 60 | USEPA (2018) | 0.9 | No | 7.8 | USEPA (2008) | Yes | **Yes** |
| Zinc | 7440-66-6 | 16.4 | | 4280 | | mg/kg | TP-3A (BURN AREA) (4/9/2007) | 0 – 0.5 | 14/14 | 100% | N/A | 4280 | MDC | 120 | USEPA (2008) | 40 | **Yes** | 46 | USEPA (2008) | Yes | **Yes** |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 5**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Upgradient Drainage; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000065 – 0.0000027 | 0.0000027 | LOQ | 0.0302 | USEPA (2006) | 0.00009 | No | 290 | LANL (2017) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000063 – 0.0000027 | 0.0000027 | LOQ | 0.202 | USEPA (2006) | 0.00001 | No | N/A | -- | -- | -- |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000059 – 0.0000025 | 0.0000025 | LOQ | 0.57 | USEPA (2006) | 0.000004 | No | N/A | -- | -- | -- |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000094 – 0.000004 | 0.000004 | LOQ | 2.95 | Modeled; USEPA (2018) | 0.000001 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000053 – 0.0000022 | 0.0000022 | LOQ | 0.02 | USEPA (2018) | 0.0001 | No | 330 | LANL (2017) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000075 – 0.0000032 | 0.0000032 | LOQ | 0.031 | USEPA (2006) | 0.0001 | No | 13 | LANL (2017) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000038 – 0.0000016 | 0.0000016 | LOQ | 0.473 | USEPA (2006) | 0.000003 | No | 0.3 | LANL (2017) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000024 – 0.00001 | 0.00001 | LOQ | 4.86 | Modeled; USEPA (2018) | 0.000002 | No | N/A | -- | -- | -- |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000062 – 0.0000026 | 0.0000026 | LOQ | 5.84 | Modeled; USEPA (2018) | 4E-07 | No | N/A | -- | -- | -- |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000005 – 0.0000021 | 0.0000021 | LOQ | 0.0165 | USEPA (2006) | 0.0001 | No | 0.0165 | USEPA (2006) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000006 – 0.0000025 | 0.0000025 | LOQ | 0.986 | USEPA (2018) | 0.000003 | No | 6.1 | LANL (2017) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000061 – 0.0000026 | 0.0000026 | LOQ | 0.428 | USEPA (2018) | 0.000006 | No | N/A | -- | -- | -- |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.0000023 | 0.0000023 | LOQ | 0.842 | USEPA (2006) | 0.000003 | No | 0.842 | USEPA (2006) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000005 – 0.0000021 | 0.0000021 | LOQ | 0.46 | USEPA (2006) | 0.000005 | No | 0.99 | LANL (2017) | No | No |
| 2-Butanone (MEK) | 78-93-3 | 0.0388 | J | 0.0388 | J | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.000003 – 0.000003 | 0.0388 | MDC | 7.604 | USEPA (2018) | 0.005 | No | 3000 | LANL (2017) | No | No |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000015 – 0.0000063 | 0.0000063 | LOQ | 0.045 | USEPA (2018) | 0.0001 | No | 0.47 | LANL (2017) | No | No |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000022 – 0.0000092 | 0.0000092 | LOQ | 0.073 | USEPA (2018) | 0.0001 | No | 17 | LANL (2017) | No | No |
| Acetone | 67-64-1 | 0.0579 | | 0.0579 | | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.0000031 – 0.0000031 | 0.0579 | MDC | 0.065 | USEPA (2018) | 0.9 | No | 17 | LANL (2017) | No | No |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000053 – 0.0000022 | 0.0000022 | LOQ | 0.137 | USEPA (2006) | 0.00002 | No | 54 | LANL (2017) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000005 – 0.0000021 | 0.0000021 | LOQ | 0.21 | USEPA (2018) | 0.00001 | No | N/A | -- | -- | -- |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000048 – 0.000002 | 0.000002 | LOQ | 0.654 | USEPA (2006) | 0.000003 | No | N/A | -- | -- | -- |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000004 – 0.0000017 | 0.0000017 | LOQ | 0.0065 | USEPA (2018) | 0.0003 | No | N/A | -- | -- | -- |
| Carbon disulfide | 75-15-0 | 0.0096 | J | 0.0096 | J | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.00000061 – 0.00000061 | 0.0096 | MDC | 0.000851 | USEPA (2006) | 10 | **Yes** | 1.3 | LANL (2017) | No | No |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000001 – 0.0000044 | 0.0000044 | LOQ | 0.0642 | USEPA (2006) | 0.00007 | No | N/A | -- | -- | -- |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000047 – 0.000002 | 0.000002 | LOQ | 0.00842 | USEPA (2006) | 0.0002 | No | 48 | LANL (2017) | No | No |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000019 – 0.0000081 | 0.0000081 | LOQ | 3.14 | Modeled; USEPA (2018) | 0.000003 | No | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000064 – 0.0000027 | 0.0000027 | LOQ | 0.087 | USEPA (2018) | 0.00003 | No | 9.2 | LANL (2017) | No | No |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000051 – 0.0000021 | 0.0000021 | LOQ | 4.76 | Modeled; USEPA (2018) | 4E-07 | No | N/A | -- | -- | -- |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000074 – 0.0000031 | 0.0000031 | LOQ | 0.432 | USEPA (2018) | 0.000007 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000045 – 0.0000019 | 0.0000019 | LOQ | 0.0000509 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000014 – 0.0000059 | 0.0000059 | LOQ | 0.893 | Modeled; USEPA (2018) | 0.000007 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000006 – 0.0000025 | 0.0000025 | LOQ | 0.021 | USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000087 – 0.0000037 | 0.0000037 | LOQ | 5.58 | Modeled; USEPA (2018) | 7E-07 | No | N/A | -- | -- | -- |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000049 – 0.0000021 | 0.0000021 | LOQ | 0.305 | USEPA (2006) | 0.000007 | No | N/A | -- | -- | -- |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.000072 | 0.000072 | LOQ | 0.105 | Modeled; USEPA (2018) | 0.0007 | No | 0.105 | Modeled; USEPA (2018) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000051 – 0.0000022 | 0.0000022 | LOQ | 0.086 | USEPA (2006) | 0.00003 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000096 – 0.0000041 | 0.0000041 | LOQ | 0.13 | USEPA (2018) | 0.00003 | No | 1.6 | LANL (2017) | No | No |
| Methyl acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000015 – 0.0000065 | 0.0000065 | LOQ | 3.1 | Modeled; USEPA (2018) | 0.000002 | No | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000061 – 0.0000026 | 0.0000026 | LOQ | 0.304 | USEPA (2018) | 0.000009 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000071 – 0.000003 | 0.000003 | LOQ | 0.861 | Modeled; USEPA (2018) | 0.000003 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000076 – 0.0000032 | 0.0000032 | LOQ | 0.018 | USEPA (2018) | 0.0002 | No | 10 | LANL (2017) | No | No |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.000062 | 0.000062 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.0000023 | 0.0000023 | LOQ | 0.13 | USEPA (2018) | 0.00002 | No | 1.6 | LANL (2017) | No | No |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000036 – 0.0000015 | 0.0000015 | LOQ | 0.559 | USEPA (2006) | 0.000003 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000009 – 0.0000038 | 0.0000038 | LOQ | 0.19 | USEPA (2006) | 0.00002 | No | 0.2 | LANL (2017) | No | No |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000059 – 0.0000025 | 0.0000025 | LOQ | 1.09 | USEPA (2006) | 0.000002 | No | 25 | LANL (2017) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000075 – 0.0000032 | 0.0000032 | LOQ | 1.05 | USEPA (2006) | 0.000003 | No | N/A | -- | -- | -- |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000043 – 0.0000018 | 0.0000018 | LOQ | 0.0000509 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000057 – 0.0000024 | 0.0000024 | LOQ | 0.0969 | USEPA (2006) | 0.00002 | No | 46 | LANL (2017) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000008 – 0.0000034 | 0.0000034 | LOQ | 3.7 | Modeled; USEPA (2018) | 9E-07 | No | 58 | LANL (2017) | No | No |

**Table 5**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Upgradient Drainage; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000071 – 0.000003 | 0.000003 | LOQ | 0.482 | USEPA (2018) | 0.000006 | No | 0.14 | LANL (2017) | No | No |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00000054 – 0.0000023 | 0.0000023 | LOQ | 0.13 | USEPA (2018) | 0.00002 | No | 1.6 | LANL (2017) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000053 | 0.000053 | LOQ | 1.22 | USEPA (2006) | 0.00004 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00006 – 0.00016 | 0.00016 | LOQ | 0.819 | USEPA (2006) | 0.0002 | No | N/A | -- | -- | -- |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000033 – 0.000092 | 0.000092 | LOQ | 0.213 | USEPA (2006) | 0.0004 | No | N/A | -- | -- | -- |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000066 – 0.00018 | 0.00018 | LOQ | 0.117 | USEPA (2006) | 0.002 | No | N/A | -- | -- | -- |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0001 – 0.00028 | 0.00028 | LOQ | 0.029 | USEPA (2006) | 0.01 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000061 – 0.00017 | 0.00017 | LOQ | 0.045 | USEPA (2018) | 0.004 | No | N/A | -- | -- | -- |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000046 – 0.00013 | 0.00013 | LOQ | 0.0416 | USEPA (2006) | 0.003 | No | 16 | LANL (2017) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000045 – 0.00012 | 0.00012 | LOQ | 0.296 | USEPA (2018) | 0.0004 | No | 8.6 | LANL (2017) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000056 – 0.00015 | 0.00015 | LOQ | 0.417 | USEPA (2003) | 0.0004 | No | N/A | -- | -- | -- |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000034 – 0.000094 | 0.000094 | LOQ | 0.0312 | USEPA (2006) | 0.003 | No | 2.6 | LANL (2017) | No | No |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.000071 | 0.000071 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000039 – 0.00011 | 0.00011 | LOQ | 0.063 | USEPA (2018) | 0.002 | No | 1700 | LANL (2017) | No | No |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000069 | 0.000069 | LOQ | 0.0141 | Modeled; USEPA (2018) | 0.005 | No | 7.3 | LANL (2017) | No | No |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000049 – 0.00014 | 0.00014 | LOQ | 0.153 | USEPA (2018) | 0.0009 | No | N/A | -- | -- | -- |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000057 – 0.00016 | 0.00016 | LOQ | 0.112 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000038 – 0.0001 | 0.0001 | LOQ | 0.127 | USEPA (2006) | 0.0008 | No | N/A | -- | -- | -- |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000031 – 0.000085 | 0.000085 | LOQ | 0.0141 | Modeled; USEPA (2018) | 0.006 | No | 7.3 | LANL (2017) | No | No |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000035 – 0.000095 | 0.000095 | LOQ | 1.477 | USEPA (2018) | 0.00006 | No | N/A | -- | -- | -- |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000056 | 0.000056 | LOQ | 3.28 | Modeled; USEPA (2018) | 0.00002 | No | 3.28 | Modeled; USEPA (2018) | No | No |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000051 – 0.00014 | 0.00014 | LOQ | 0.005 | USEPA (2018) | 0.03 | No | N/A | -- | -- | -- |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000068 | 0.000068 | LOQ | 0.0009 | USEPA (2018) | 0.08 | No | N/A | -- | -- | -- |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000052 | 0.000052 | LOQ | 3.22 | Modeled; USEPA (2018) | 0.00002 | No | 3.22 | Modeled; USEPA (2018) | No | No |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000027 – 0.000076 | 0.000076 | LOQ | 0.0141 | Modeled; USEPA (2018) | 0.005 | No | 7.3 | LANL (2017) | No | No |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000054 – 0.00015 | 0.00015 | LOQ | 0.153 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000056 | 0.000056 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000044 | 0.000044 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.000069 | 0.000069 | LOQ | 7.85 | Modeled; USEPA (2018) | 0.000009 | No | N/A | -- | -- | -- |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000015 – 0.000042 | 0.000042 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000034 – 0.000095 | 0.000095 | LOQ | 0.00662 | USEPA (2006) | 0.01 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000053 | 0.000053 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000038 | 0.000038 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000018 – 0.00005 | 0.00005 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.00006 | 0.00006 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00003 – 0.000083 | 0.000083 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.000071 | 0.000071 | LOQ | 12.1 | Modeled; USEPA (2018) | 0.000006 | No | N/A | -- | -- | -- |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000055 | 0.000055 | LOQ | 8.59 | Modeled; USEPA (2018) | 0.000006 | No | N/A | -- | -- | -- |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00003 – 0.000082 | 0.000082 | LOQ | 3.98 | Modeled; USEPA (2018) | 0.00002 | No | N/A | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.161 | | 0.161 | | mg/kg | SD-10 (5/2/2007) | N/A | 1/2 | 50% | 0.00014 – 0.00014 | 0.161 | MDC | 0.18 | USEPA (2006) | 0.9 | No | 0.026 | LANL (2017) | Yes | **Yes** |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00003 – 0.000083 | 0.000083 | LOQ | 10.9 | USEPA (2006) | 0.000008 | No | 100 | LANL (2017) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000038 – 0.00011 | 0.00011 | LOQ | 1.38 | Modeled; USEPA (2018) | 0.00008 | No | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000044 | 0.000044 | LOQ | 69 | USEPA (2018) | 6E-07 | No | 130 | LANL (2017) | No | No |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000015 – 0.00004 | 0.00004 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000021 – 0.000057 | 0.000057 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.000051 | 0.000051 | LOQ | 0.415 | USEPA (2006) | 0.0001 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000047 | 0.000047 | LOQ | 0.218 | USEPA (2006) | 0.0002 | No | 4000 | LANL (2017) | No | No |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000047 | 0.000047 | LOQ | 0.53 | USEPA (2018) | 0.00009 | No | 90 | LANL (2017) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.00007 | 0.00007 | LOQ | 1.16 | USEPA (2006) | 0.00006 | No | 0.014 | LANL (2017) | No | No |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000034 – 0.000094 | 0.000094 | LOQ | 0.039 | USEPA (2018) | 0.002 | No | 1 | LANL (2017) | No | No |

**Table 5**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Upgradient Drainage; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Fluoranthene | 206-44-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000039 | 0.000039 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000044 | 0.000044 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000023 – 0.000063 | 0.000063 | LOQ | 0.02 | USEPA (2006) | 0.003 | No | 0.02 | USEPA (2018) | No | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000029 – 0.000079 | 0.000079 | LOQ | 0.139 | USEPA (2006) | 0.0006 | No | 0.069 | USEPA (2018) | No | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000055 | 0.000055 | LOQ | 0.804 | USEPA (2006) | 0.00007 | No | N/A | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000025 – 0.00007 | 0.00007 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.000054 | 0.000054 | LOQ | 0.876 | USEPA (2018) | 0.00006 | No | N/A | -- | -- | -- |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000028 – 0.000076 | 0.000076 | LOQ | 0.407 | USEPA (2018) | 0.0002 | No | 24 | LANL (2017) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000026 – 0.00007 | 0.00007 | LOQ | 1.78 | Modeled; USEPA (2018) | 0.00004 | No | N/A | -- | -- | -- |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000016 – 0.000045 | 0.000045 | LOQ | 2.68 | USEPA (2006) | 0.00002 | No | N/A | -- | -- | -- |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000045 – 0.00012 | 0.00012 | LOQ | 0.504 | USEPA (2006) | 0.0002 | No | 0.065 | USEPA (2018) | No | No |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000017 – 0.000048 | 0.000048 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000049 – 0.00014 | 0.00014 | LOQ | 0.42 | USEPA (2006) | 0.0003 | No | 750 | LANL (2017) | No | No |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.000038 | 0.000038 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Total PAHs | T-PAH | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | N/A | N/A | -- | 1.61 | USEPA (2006) | -- | -- | 1.61 | USEPA (2006) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | 0.065 | | 0.065 | | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.0000016 – 0.0000016 | 0.065 | MDC | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| 4,4'-DDE | 72-55-9 | 0.0268 | | 0.149 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.149 | MDC | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| 4,4'-DDT | 50-29-3 | 0.0108 | | 0.0108 | | mg/kg | SD-10 (5/2/2007) | N/A | 1/2 | 50% | 0.000013 – 0.000013 | 0.0108 | MDC | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.002 | USEPA (2006) | 0.007 | No | 0.042 | USEPA (2018) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.006 | USEPA (2006) | 0.002 | No | 0.006 | USEPA (2006) | No | No |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.0027 | USEPA (2018) | 0.005 | No | 0.00006 | USEPA (2018) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.005 | USEPA (2006) | 0.003 | No | 0.3 | USEPA (2018) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.005 | USEPA (2006) | 0.003 | No | 0.3 | USEPA (2018) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.00072 | USEPA (2006) | 0.02 | No | 0.0077 | USEPA (2018) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.000357 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.0029 | USEPA (2006) | 0.004 | No | 0.0029 | USEPA (2006) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.0029 | USEPA (2006) | 0.004 | No | 0.0029 | USEPA (2006) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.00222 | USEPA (2006) | 0.006 | No | 0.008 | USEPA (2018) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.00222 | USEPA (2006) | 0.006 | No | 0.008 | USEPA (2018) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000004 – 0.000033 | 0.000033 | LOQ | 0.00222 | USEPA (2006) | 0.01 | No | 0.008 | USEPA (2018) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.00032 | USEPA (2006) | 0.04 | No | 0.01 | USEPA (2018) | No | No |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.0027 | USEPA (2018) | 0.005 | No | 0.00006 | USEPA (2018) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.068 | USEPA (2006) | 0.0002 | No | 0.0006 | USEPA (2018) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000016 – 0.000013 | 0.000013 | LOQ | 0.0006 | USEPA (2006) | 0.02 | No | 0.0006 | USEPA (2006) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000004 – 0.000033 | 0.000033 | LOQ | 0.0187 | USEPA (2006) | 0.002 | No | 0.03 | USEPA (2018) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.00002 – 0.00016 | 0.00016 | LOQ | 0.0001 | USEPA (2006) | 2 | Yes | 0.0001 | USEPA (2018) | Yes | No |
| Total DDD/DDE/DDT | TOT-DDT | 0.0375 | | 0.2139 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.2139 | MDC | 0.0053 | USEPA (2018) | 40 | Yes | 0.0053 | USEPA (2018) | Yes | Yes |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.0000075 – 0.000062 | 0.000062 | LOQ | 0.04 | USEPA (2006) | 0.002 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000024 – 0.0002 | 0.0002 | LOQ | 0.04 | USEPA (2006) | 0.005 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000022 – 0.00018 | 0.00018 | LOQ | 0.04 | USEPA (2006) | 0.005 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000013 – 0.0001 | 0.0001 | LOQ | 0.04 | USEPA (2006) | 0.003 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000014 – 0.00011 | 0.00011 | LOQ | 0.04 | USEPA (2006) | 0.003 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000019 – 0.00015 | 0.00015 | LOQ | 0.04 | USEPA (2006) | 0.004 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.000008 – 0.000066 | 0.000066 | LOQ | 0.04 | USEPA (2006) | 0.002 | No | 0.014 | USEPA (2018) | No | No |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/2 | 0% | 0.28 – 0.68 | 0.68 | LOQ | 0.1 | USEPA (2006) | 7 | Yes | 0.14 | LANL (2017) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7770 | | 17600 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 17600 | MDC | 25000 | USEPA (2018) | 0.7 | No | 25000 | LANL (2017) | No | No |
| Antimony | 7440-36-0 | 2.8 | | 2.8 | | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.88 – 0.88 | 2.8 | MDC | 2 | USEPA (2006) | 1 | Yes | 45 | LANL (2017) | No | No |

**Table 5**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Upgradient Drainage; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Arsenic | 7440-38-2 | 3 | J | 13.3 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 13.3 | MDC | 7.24 | USEPA (2006) | 2 | Yes | 7.24 | USEPA (2006) | Yes | Yes |
| Barium | 7440-39-3 | 30.2 | | 85.2 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 85.2 | MDC | 20 | USEPA (2018) | 4 | Yes | 2900 | LANL (2017) | No | No |
| Beryllium | 7440-41-7 | 0.2 | B | 0.61 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.61 | MDC | N/A | -- | -- | -- | 66 | LANL (2017) | No | No |
| Cadmium | 7440-43-9 | 1.2 | | 1.5 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 1.5 | MDC | 0.68 | USEPA (2006) | 2 | Yes | 0.68 | USEPA (2006) | Yes | Yes |
| Calcium | 7440-70-2 | 468 | BJ | 3970 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 3970 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Chromium | 7440-47-3 | 8.6 | J | 27.5 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 27.5 | MDC | 43.4 | USEPA (2006) | 0.6 | No | 43.4 | USEPA (2006) | No | No |
| Cobalt | 7440-48-4 | 2 | B | 4.2 | B | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 4.2 | MDC | 50 | USEPA (2006) | 0.08 | No | 220 | LANL (2017) | No | No |
| Copper | 7440-50-8 | 26.6 | | 56.5 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 56.5 | MDC | 18.7 | USEPA (2006) | 3 | Yes | 18.7 | USEPA (2006) | Yes | Yes |
| Iron | 7439-89-6 | 5670 | J | 19400 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 19400 | MDC | 20000 | USEPA (2006) | 1 | Yes | N/A | -- | -- | -- |
| Lead | 7439-92-1 | 22.2 | J | 96.9 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 96.9 | MDC | 30.2 | USEPA (2006) | 3 | Yes | 30.2 | USEPA (2006) | Yes | Yes |
| Magnesium | 7439-95-4 | 541 | B | 3720 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 3720 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Manganese | 7439-96-5 | 82.6 | J | 111 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 111 | MDC | 460 | USEPA (2006) | 0.2 | No | 4700 | LANL (2017) | No | No |
| Mercury | 7439-97-6 | 0.069 | B | 0.49 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.49 | MDC | 0.13 | USEPA (2006) | 4 | Yes | 0.13 | USEPA (2006) | Yes | Yes |
| Nickel | 7440-02-0 | 5.6 | J | 18.5 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 18.5 | MDC | 15.9 | USEPA (2006) | 1 | Yes | 15.9 | USEPA (2006) | Yes | Yes |
| Potassium | 7440-09-7 | 332 | B | 1300 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 1300 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Selenium | 7782-49-2 | 1.7 | B | 1.7 | B | mg/kg | SD-9 (5/2/2007) | N/A | 1/2 | 50% | 0.91 – 0.91 | 1.7 | MDC | 2 | USEPA (2006) | 0.9 | No | 2 | USEPA (2006) | No | No |
| Silver | 7440-22-4 | 0.65 | B | 1.5 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 1.5 | MDC | 0.73 | USEPA (2006) | 2 | Yes | 0.73 | USEPA (2006) | Yes | Yes |
| Sodium | 7440-23-5 | 162 | B | 2690 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 2690 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Thallium | 7440-28-0 | 0.079 | B | 0.12 | B | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 0.12 | MDC | N/A | -- | -- | -- | 0.73 | LANL (2017) | No | No |
| Vanadium | 7440-62-2 | 12.7 | | 31.6 | | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 31.6 | MDC | N/A | -- | -- | -- | 29 | LANL (2017) | Yes | Yes |
| Zinc | 7440-66-6 | 71.6 | J | 324 | J | mg/kg | SD-9 (5/2/2007) | N/A | 2/2 | 100% | N/A | 324 | MDC | 121 | USEPA (2006) | 3 | Yes | 121 | USEPA (2006) | Yes | Yes |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 6**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? [2] |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000002 – 0.000027 | 0.000027 | LOQ | 0.0302 | USEPA (2006) | 0.0009 | No | 290 | LANL (2017) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000019 – 0.000027 | 0.000027 | LOQ | 0.202 | USEPA (2006) | 0.0001 | No | N/A | -- | -- | -- |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.000027 | LOQ | 0.57 | USEPA (2006) | 0.00005 | No | N/A | -- | -- | -- |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000028 – 0.000027 | 0.000027 | LOQ | 2.95 | Modeled; USEPA (2018) | 0.000009 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000027 | 0.000027 | LOQ | 0.02 | USEPA (2018) | 0.001 | No | 330 | LANL (2017) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000023 – 0.000027 | 0.000027 | LOQ | 0.031 | USEPA (2006) | 0.0009 | No | 13 | LANL (2017) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000012 – 0.000027 | 0.000027 | LOQ | 0.473 | USEPA (2006) | 0.00006 | No | 0.3 | LANL (2017) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000071 – 0.000027 | 0.000027 | LOQ | 4.86 | Modeled; USEPA (2018) | 0.000006 | No | N/A | -- | -- | -- |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000019 – 0.000027 | 0.000027 | LOQ | 5.84 | Modeled; USEPA (2018) | 0.000005 | No | N/A | -- | -- | -- |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.000027 | LOQ | 0.0165 | USEPA (2006) | 0.002 | No | 0.0165 | USEPA (2006) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.000027 | LOQ | 0.986 | USEPA (2018) | 0.00003 | No | 6.1 | LANL (2017) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.000027 | LOQ | 0.428 | USEPA (2018) | 0.00006 | No | N/A | -- | -- | -- |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000027 | 0.000027 | LOQ | 0.842 | USEPA (2006) | 0.00003 | No | 0.842 | USEPA (2006) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.000027 | LOQ | 0.46 | USEPA (2006) | 0.00006 | No | 0.99 | LANL (2017) | No | No |
| 2-Butanone (MEK) | 78-93-3 | 0.025 | J | 0.164 | | mg/kg | SD-8 (5/2/2007) | N/A | 8/19 | 42% | 0.000009 – 0.000054 | 0.164 | MDC | 7.604 | USEPA (2018) | 0.02 | No | 3000 | LANL (2017) | No | No |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000045 – 0.000054 | 0.000054 | LOQ | 0.045 | USEPA (2018) | 0.001 | No | 0.47 | LANL (2017) | No | No |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000066 – 0.000054 | 0.000054 | LOQ | 0.073 | USEPA (2018) | 0.0007 | No | 17 | LANL (2017) | No | No |
| Acetone | 67-64-1 | 0.028 | J | 0.33 | J | mg/kg | SD13 (8/23/2016) | 0 – 0.5 | 15/19 | 79% | 0.000018 – 0.000044 | 0.33 | MDC | 0.065 | USEPA (2018) | 5 | **Yes** | 17 | LANL (2017) | No | No |
| Benzene | 71-43-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000027 | 0.000027 | LOQ | 0.137 | USEPA (2006) | 0.0002 | No | 54 | LANL (2017) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.000027 | LOQ | 0.21 | USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| Bromoform | 75-25-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000014 – 0.000027 | 0.000027 | LOQ | 0.654 | USEPA (2006) | 0.00004 | No | N/A | -- | -- | -- |
| Bromomethane | 74-83-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000012 – 0.000027 | 0.000027 | LOQ | 0.0065 | USEPA (2018) | 0.004 | No | N/A | -- | -- | -- |
| Carbon disulfide | 75-15-0 | 0.0084 | J | 0.18 | | mg/kg | SD18 (8/30/2016) | 0 – 0.5 | 16/19 | 84% | 0.0000044 – 0.000023 | 0.18 | MDC | 0.000851 | USEPA (2006) | 200 | **Yes** | 1.3 | LANL (2017) | No | No |
| Carbon tetrachloride | 56-23-5 | 0.03 | J | 0.03 | J | mg/kg | SD21 (8/26/2016) | 0 – 0.5 | 1/19 | 5% | 0.0000031 – 0.000027 | 0.03 | MDC | 0.0642 | USEPA (2006) | 0.5 | No | N/A | -- | -- | -- |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000014 – 0.000027 | 0.000027 | LOQ | 0.00842 | USEPA (2006) | 0.003 | No | 48 | LANL (2017) | No | No |
| Chloroethane | 75-00-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000057 – 0.000027 | 0.000027 | LOQ | 3.14 | Modeled; USEPA (2018) | 0.000009 | No | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000019 – 0.000027 | 0.000027 | LOQ | 0.087 | USEPA (2018) | 0.0003 | No | 9.2 | LANL (2017) | No | No |
| Chloromethane | 74-87-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.000027 | LOQ | 4.76 | Modeled; USEPA (2018) | 0.000006 | No | N/A | -- | -- | -- |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000022 – 0.000027 | 0.000027 | LOQ | 0.432 | USEPA (2018) | 0.00006 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000014 – 0.000027 | 0.000027 | LOQ | 0.0000509 | USEPA (2006) | 0.5 | No | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | 0.0145 | J | 0.0218 | J | mg/kg | SD-4 (5/2/2007) | N/A | 2/19 | 11% | 0.0000042 – 0.000027 | 0.0218 | MDC | 0.893 | Modeled; USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.000027 | LOQ | 0.021 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000026 – 0.000027 | 0.000027 | LOQ | 5.58 | Modeled; USEPA (2018) | 0.000005 | No | N/A | -- | -- | -- |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.000027 | LOQ | 0.305 | USEPA (2006) | 0.00009 | No | N/A | -- | -- | -- |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00006 – 0.0017 | 0.0017 | LOQ | 0.105 | Modeled; USEPA (2018) | 0.02 | No | 0.105 | Modeled; USEPA (2018) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000015 – 0.000027 | 0.000027 | LOQ | 0.086 | USEPA (2006) | 0.0003 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.0000029 – 0.00001 | 0.00001 | LOQ | 0.13 | USEPA (2018) | 0.00008 | No | 1.6 | LANL (2017) | No | No |
| Methyl acetate | 79-20-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000046 – 0.000027 | 0.000027 | LOQ | 3.1 | Modeled; USEPA (2018) | 0.000009 | No | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.000027 | LOQ | 0.304 | USEPA (2018) | 0.00009 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000021 – 0.000027 | 0.000027 | LOQ | 0.861 | Modeled; USEPA (2018) | 0.00003 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | 0.0092 | J | 0.0092 | J | mg/kg | SD-4 (5/2/2007) | N/A | 1/19 | 5% | 0.0000023 – 0.000027 | 0.0092 | MDC | 0.018 | USEPA (2018) | 0.5 | No | 10 | LANL (2017) | No | No |
| Naphthalene | 91-20-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0014 | 0.0014 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| o-Xylene | 95-47-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.0000016 – 0.0000059 | 0.0000059 | LOQ | 0.13 | USEPA (2018) | 0.00005 | No | 1.6 | LANL (2017) | No | No |
| Styrene | 100-42-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000011 – 0.000027 | 0.000027 | LOQ | 0.559 | USEPA (2006) | 0.00005 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000027 – 0.000027 | 0.000027 | LOQ | 0.19 | USEPA (2006) | 0.0001 | No | 0.2 | LANL (2017) | No | No |
| Toluene | 108-88-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000018 – 0.000027 | 0.000027 | LOQ | 1.09 | USEPA (2006) | 0.00002 | No | 25 | LANL (2017) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000023 – 0.000027 | 0.000027 | LOQ | 1.05 | USEPA (2006) | 0.00003 | No | N/A | -- | -- | -- |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000013 – 0.000027 | 0.000027 | LOQ | 0.0000509 | USEPA (2006) | 0.5 | No | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000017 – 0.000027 | 0.000027 | LOQ | 0.0969 | USEPA (2006) | 0.0003 | No | 46 | LANL (2017) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000024 – 0.000027 | 0.000027 | LOQ | 3.7 | Modeled; USEPA (2018) | 0.000007 | No | 58 | LANL (2017) | No | No |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000021 – 0.000027 | 0.000027 | LOQ | 0.482 | USEPA (2018) | 0.00006 | No | 0.14 | LANL (2017) | No | No |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0000016 – 0.000054 | 0.000054 | LOQ | 0.13 | USEPA (2018) | 0.0004 | No | 1.6 | LANL (2017) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |

**Table 6**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? [2] |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000044 – 0.0012 | 0.0012 | LOQ | 1.22 | USEPA (2006) | 0.001 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00014 – 0.0038 | 0.0038 | LOQ | 0.819 | USEPA (2006) | 0.005 | No | N/A | -- | -- | -- |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000077 – 0.0021 | 0.0021 | LOQ | 0.213 | USEPA (2006) | 0.01 | No | N/A | -- | -- | -- |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00015 – 0.0042 | 0.0042 | LOQ | 0.117 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00023 – 0.0065 | 0.0065 | LOQ | 0.029 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00014 – 0.0038 | 0.0038 | LOQ | 0.045 | USEPA (2018) | 0.08 | No | N/A | -- | -- | -- |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00011 – 0.0029 | 0.0029 | LOQ | 0.0416 | USEPA (2006) | 0.07 | No | 16 | LANL (2017) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0001 – 0.0029 | 0.0029 | LOQ | 0.296 | USEPA (2018) | 0.01 | No | 8.6 | LANL (2017) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00013 – 0.0035 | 0.0035 | LOQ | 0.417 | USEPA (2003) | 0.008 | No | N/A | -- | -- | -- |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000078 – 0.0022 | 0.0022 | LOQ | 0.0312 | USEPA (2006) | 0.07 | No | 2.6 | LANL (2017) | No | No |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0016 | 0.0016 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000089 – 0.0025 | 0.0025 | LOQ | 0.063 | USEPA (2018) | 0.04 | No | 1700 | LANL (2017) | No | No |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000058 – 0.0016 | 0.0016 | LOQ | 0.0141 | Modeled; USEPA (2018) | 0.1 | No | 7.3 | LANL (2017) | No | No |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00011 – 0.0031 | 0.0031 | LOQ | 0.153 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00013 – 0.0036 | 0.0036 | LOQ | 0.112 | USEPA (2018) | 0.03 | No | N/A | -- | -- | -- |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000087 – 0.0024 | 0.0024 | LOQ | 0.127 | USEPA (2006) | 0.02 | No | N/A | -- | -- | -- |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000071 – 0.002 | 0.002 | LOQ | 0.0141 | Modeled; USEPA (2018) | 0.1 | No | 7.3 | LANL (2017) | No | No |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000079 – 0.0028 | 0.0028 | LOQ | 1.477 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000046 – 0.0013 | 0.0013 | LOQ | 3.28 | Modeled; USEPA (2018) | 0.0004 | No | 3.28 | Modeled; USEPA (2018) | No | No |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00012 – 0.0032 | 0.0032 | LOQ | 0.005 | USEPA (2018) | 0.6 | No | N/A | -- | -- | -- |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000057 – 0.0016 | 0.0016 | LOQ | 0.0009 | USEPA (2018) | 2 | Yes | N/A | -- | -- | -- |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000043 – 0.0012 | 0.0012 | LOQ | 3.22 | Modeled; USEPA (2018) | 0.0004 | No | 3.22 | Modeled; USEPA (2018) | No | No |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000063 – 0.0017 | 0.0017 | LOQ | 0.0141 | Modeled; USEPA (2018) | 0.1 | No | 7.3 | LANL (2017) | No | No |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00012 – 0.0034 | 0.0034 | LOQ | 0.153 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Acenaphthene | 83-32-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000047 – 0.0013 | 0.0013 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000037 – 0.001 | 0.001 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000058 – 0.0016 | 0.0016 | LOQ | 7.85 | Modeled; USEPA (2018) | 0.0002 | No | N/A | -- | -- | -- |
| Anthracene | 120-12-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000035 – 0.00098 | 0.00098 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000079 – 0.0022 | 0.0022 | LOQ | 0.00662 | USEPA (2006) | 0.3 | No | N/A | -- | -- | -- |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 0.00041 – 0.00057 | 0.00057 | LOQ | 0.059 | USEPA (2018) | 0.01 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000044 – 0.0012 | 0.0012 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000032 – 0.00088 | 0.00088 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000042 – 0.0012 | 0.0012 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0014 | 0.0014 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0019 | 0.0019 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000059 – 0.0016 | 0.0016 | LOQ | 12.1 | Modeled; USEPA (2018) | 0.0001 | No | N/A | -- | -- | -- |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000045 – 0.0013 | 0.0013 | LOQ | 8.59 | Modeled; USEPA (2018) | 0.0002 | No | N/A | -- | -- | -- |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000068 – 0.0019 | 0.0019 | LOQ | 3.98 | Modeled; USEPA (2018) | 0.0005 | No | N/A | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 4.36 | | 162 | | mg/kg | SD-5 (4/30/2007) | N/A | 2/19 | 11% | 0.00012 – 0.00057 | 162 | MDC | 0.18 | USEPA (2006) | 900 | Yes | 0.026 | LANL (2017) | Yes | Yes |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000069 – 0.0019 | 0.0019 | LOQ | 10.9 | USEPA (2006) | 0.0002 | No | 100 | LANL (2017) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000088 – 0.0024 | 0.0024 | LOQ | 1.38 | Modeled; USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000037 – 0.001 | 0.001 | LOQ | 69 | USEPA (2018) | 0.00001 | No | 130 | LANL (2017) | No | No |
| Chrysene | 218-01-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000034 – 0.00093 | 0.00093 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000048 – 0.0013 | 0.0013 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000042 – 0.0012 | 0.0012 | LOQ | 0.415 | USEPA (2006) | 0.003 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000039 – 0.0011 | 0.0011 | LOQ | 0.218 | USEPA (2006) | 0.005 | No | 4000 | LANL (2017) | No | No |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000039 – 0.0011 | 0.0011 | LOQ | 0.53 | USEPA (2018) | 0.002 | No | 90 | LANL (2017) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000058 – 0.0016 | 0.0016 | LOQ | 1.16 | USEPA (2006) | 0.001 | No | 0.014 | LANL (2017) | No | No |
| Di-n-octyl phthalate | 117-84-0 | 3.08 | | 3.08 | | mg/kg | SD-5 (4/30/2007) | N/A | 1/19 | 5% | 0.000078 – 0.00057 | 3.08 | MDC | 0.039 | USEPA (2018) | 80 | Yes | 1 | LANL (2017) | Yes | Yes |
| Fluoranthene | 206-44-0 | 0.017 | J | 0.017 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/19 | 5% | 0.000032 – 0.00089 | 0.017 | MDC | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000037 – 0.001 | 0.001 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000052 – 0.0015 | 0.0015 | LOQ | 0.02 | USEPA (2006) | 0.08 | No | 0.02 | USEPA (2018) | No | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/17 | 0% | 0.000065 – 0.0028 | 0.0028 | LOQ | 0.139 | USEPA (2006) | 0.02 | No | 0.069 | USEPA (2018) | No | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000046 – 0.0013 | 0.0013 | LOQ | 0.804 | USEPA (2006) | 0.002 | No | N/A | -- | -- | -- |

**Table 6**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits [1] | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? [2] |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000049 – 0.0016 | 0.0016 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000045 – 0.0013 | 0.0013 | LOQ | 0.876 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000064 – 0.0018 | 0.0018 | LOQ | 0.407 | USEPA (2018) | 0.004 | No | 24 | LANL (2017) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000059 – 0.0016 | 0.0016 | LOQ | 1.78 | Modeled; USEPA (2018) | 0.0009 | No | N/A | -- | -- | -- |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000038 – 0.001 | 0.001 | LOQ | 2.68 | USEPA (2006) | 0.0004 | No | N/A | -- | -- | -- |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.0001 – 0.0028 | 0.0028 | LOQ | 0.504 | USEPA (2006) | 0.006 | No | 0.065 | USEPA (2018) | No | No |
| Phenanthrene | 85-01-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00004 – 0.0011 | 0.0011 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.00011 – 0.0031 | 0.0031 | LOQ | 0.42 | USEPA (2006) | 0.007 | No | 750 | LANL (2017) | No | No |
| Pyrene | 129-00-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/19 | 0% | 0.000031 – 0.00087 | 0.00087 | LOQ | See Total PAHs | USEPA (2006) | -- | -- | See Total PAHs | USEPA (2006) | -- | -- |
| Total PAHs | T-PAH | 0 | | 0 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/19 | 5% | N/A | 0 | MDC | 1.61 | USEPA (2006) | #NUM! | -- | 1.61 | USEPA (2006) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.002 | USEPA (2006) | 0.01 | No | 0.042 | USEPA (2018) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.006 | USEPA (2006) | 0.005 | No | 0.006 | USEPA (2006) | No | No |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.0027 | USEPA (2018) | 0.01 | No | 0.00006 | USEPA (2018) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.005 | USEPA (2006) | 0.006 | No | 0.3 | USEPA (2018) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.005 | USEPA (2006) | 0.006 | No | 0.3 | USEPA (2018) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.00072 | USEPA (2006) | 0.04 | No | 0.0077 | USEPA (2018) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.000357 | USEPA (2006) | 0.08 | No | N/A | -- | -- | -- |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.0029 | USEPA (2006) | 0.01 | No | 0.0029 | USEPA (2006) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.0029 | USEPA (2006) | 0.01 | No | 0.0029 | USEPA (2006) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.00222 | USEPA (2006) | 0.01 | No | 0.008 | USEPA (2018) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.00222 | USEPA (2006) | 0.01 | No | 0.008 | USEPA (2018) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000027 – 0.000072 | 0.000072 | LOQ | 0.00222 | USEPA (2006) | 0.03 | No | 0.008 | USEPA (2018) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.00032 | USEPA (2006) | 0.09 | No | 0.01 | USEPA (2018) | No | No |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.0027 | USEPA (2018) | 0.01 | No | 0.00006 | USEPA (2018) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.068 | USEPA (2006) | 0.0004 | No | 0.0006 | USEPA (2018) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000011 – 0.000029 | 0.000029 | LOQ | 0.0006 | USEPA (2006) | 0.05 | No | 0.0006 | USEPA (2006) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000027 – 0.000072 | 0.000072 | LOQ | 0.0187 | USEPA (2006) | 0.004 | No | 0.03 | USEPA (2018) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00014 – 0.00036 | 0.00036 | LOQ | 0.0001 | USEPA (2006) | 4 | Yes | 0.0001 | USEPA (2018) | Yes | No |
| Total DDD/DDE/DDT | TOT-DDT | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | N/A | N/A | -- | 0.0053 | USEPA (2018) | -- | -- | 0.0053 | USEPA (2018) | No | No |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000051 – 0.00014 | 0.00014 | LOQ | 0.04 | USEPA (2006) | 0.004 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00016 – 0.00043 | 0.00043 | LOQ | 0.04 | USEPA (2006) | 0.01 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00015 – 0.00039 | 0.00039 | LOQ | 0.04 | USEPA (2006) | 0.01 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000086 – 0.00023 | 0.00023 | LOQ | 0.04 | USEPA (2006) | 0.006 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000093 – 0.00025 | 0.00025 | LOQ | 0.04 | USEPA (2006) | 0.006 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.00013 – 0.00034 | 0.00034 | LOQ | 0.04 | USEPA (2006) | 0.009 | No | 0.014 | USEPA (2018) | No | No |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.000055 – 0.00015 | 0.00015 | LOQ | 0.04 | USEPA (2006) | 0.004 | No | 0.014 | USEPA (2018) | No | No |
| **Dioxins and Furans** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | 0.00000275 | J | 0.000117 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 10/11 | 91% | 5.27E-06 – 5.27E-06 | 0.000117 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | 0.00000354 | J | 0.00000354 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/11 | 9% | 4.07E-06 – 5.75E-06 | 0.00000354 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | 0.00000313 | J | 0.00000313 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/11 | 9% | 4.07E-06 – 5.75E-06 | 0.00000313 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | 0.00000538 | J | 0.00000538 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 1/11 | 9% | 4.07E-06 – 5.75E-06 | 0.00000538 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | 0.0000026 | J | 0.00000817 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 5/11 | 45% | 4.29E-06 – 5.75E-06 | 0.00000817 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |

**Table 6**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Sediment)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Sediment
**Exposure Medium:** Sediment
**Exposure Point:** Sediment

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| 2,3,4,7,8-PECDF | 57117-31-4 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 4.07E-06 – 5.75E-06 | 0.00000575 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 8.11E-07 – 1.15E-06 | 0.00000115 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | 0.000000479 | J | 0.00000147 | J | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 6/11 | 55% | 8.56E-07 – 1.15E-06 | 0.00000147 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| OCDD | 3268-87-9 | 0.0000327 | | 0.00202 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 11/11 | 100% | N/A | 0.00202 | MDC | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| OCDF | 39001-02-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/11 | 0% | 8.11E-06 – 1.15E-05 | 0.0000115 | LOQ | See TEQ | USEPA (2018) | -- | -- | See TEQ | USEPA (2018) | -- | -- |
| Total TEQ (Bird) | TEQ-BIRD | 3.672E-08 | | 3.88484E-06 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 11/11 | 100% | N/A | 3.8848E-06 | MDC | N/A | -- | -- | -- | 0.000002 | USEPA (2018) | Yes | **Yes** |
| Total TEQ (Mammal) | TEQ-MAMMAL | 1.1016E-07 | | 4.87628E-06 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 11/11 | 100% | N/A | 4.8763E-06 | MDC | N/A | -- | -- | -- | 0.000002 | USEPA (2018) | Yes | **Yes** |
| Total TEQ (Fish) | TEQ-FISH | 3.672E-08 | | 2.9291E-06 | | mg/kg | SD16 (8/30/2016) | 0 – 0.5 | 11/11 | 100% | N/A | 2.9291E-06 | MDC | 0.00000085 | USEPA (2006) | 3 | **Yes** | N/A | -- | -- | -- |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | mg/kg | N/A | N/A | 0/8 | 0% | 0.55 – 1.6 | 1.6 | LOQ | 0.1 | USEPA (2006) | 20 | **Yes** | 0.14 | LANL (2017) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 12200 | | 28000 | | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 28000 | MDC | 25000 | USEPA (2018) | 1 | **Yes** | 25000 | LANL (2017) | Yes | **Yes** |
| Antimony | 7440-36-0 | N/A | | N/A | | mg/kg | N/A | N/A | 0/16 | 0% | 0.65 – 2.8 | 2.8 | LOQ | 2 | USEPA (2006) | 1 | **Yes** | 45 | LANL (2017) | No | No |
| Arsenic | 7440-38-2 | 4 | J | 21.3 | J | mg/kg | SD-4D (5/2/2007) | N/A | 19/19 | 100% | N/A | 21.3 | MDC | 7.24 | USEPA (2006) | 3 | **Yes** | 7.24 | USEPA (2006) | Yes | **Yes** |
| Barium | 7440-39-3 | 24.8 | B | 62 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 62 | MDC | 20 | USEPA (2018) | 3 | **Yes** | 2900 | LANL (2017) | No | No |
| Beryllium | 7440-41-7 | 0.21 | B | 0.85 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 16/19 | 84% | 0.24 – 0.41 | 0.85 | MDC | N/A | -- | -- | -- | 66 | LANL (2017) | No | No |
| Cadmium | 7440-43-9 | 0.093 | J | 0.37 | B | mg/kg | SD-2 (5/2/2007) | N/A | 13/19 | 68% | 0.13 – 0.3 | 0.37 | MDC | 0.68 | USEPA (2006) | 0.5 | No | 0.68 | USEPA (2006) | No | No |
| Calcium | 7440-70-2 | 2000 | | 30900 | J | mg/kg | SD-4 (5/2/2007) | N/A | 19/19 | 100% | N/A | 30900 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Chromium | 7440-47-3 | 16.4 | J | 59 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 59 | MDC | 43.4 | USEPA (2006) | 1 | **Yes** | 43.4 | USEPA (2006) | Yes | **Yes** |
| Cobalt | 7440-48-4 | 3 | B | 9.3 | | mg/kg | Multiple Locations | N/A | 19/19 | 100% | N/A | 9.3 | MDC | 50 | USEPA (2006) | 0.2 | No | 220 | LANL (2017) | No | No |
| Copper | 7440-50-8 | 8.8 | | 21.9 | | mg/kg | SD-2 (5/2/2007) | N/A | 19/19 | 100% | N/A | 21.9 | MDC | 18.7 | USEPA (2006) | 1 | **Yes** | 18.7 | USEPA (2006) | Yes | **Yes** |
| Iron | 7439-89-6 | 11500 | J | 34000 | | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 34000 | MDC | 20000 | USEPA (2006) | 2 | **Yes** | N/A | -- | -- | -- |
| Lead | 7439-92-1 | 8.9 | J | 45.3 | J | mg/kg | SD-2 (5/2/2007) | N/A | 19/19 | 100% | N/A | 45.3 | MDC | 30.2 | USEPA (2006) | 2 | **Yes** | 30.2 | USEPA (2006) | Yes | **Yes** |
| Magnesium | 7439-95-4 | 3180 | | 13000 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 13000 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Manganese | 7439-96-5 | 58.3 | J | 290 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 290 | MDC | 460 | USEPA (2006) | 0.6 | No | 4700 | LANL (2017) | No | No |
| Mercury | 7439-97-6 | 0.038 | B | 0.12 | B | mg/kg | Multiple Locations | N/A | 13/19 | 68% | 0.052 – 0.16 | 0.12 | MDC | 0.13 | USEPA (2006) | 0.9 | No | 0.13 | USEPA (2006) | No | No |
| Nickel | 7440-02-0 | 8.3 | J | 26 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 26 | MDC | 15.9 | USEPA (2006) | 2 | **Yes** | 15.9 | USEPA (2006) | Yes | **Yes** |
| Potassium | 7440-09-7 | 1110 | | 7100 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 7100 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Selenium | 7782-49-2 | 1.4 | B | 3.4 | | mg/kg | SD-5 (4/30/2007) | N/A | 7/19 | 37% | 1.3 – 3 | 3.4 | MDC | 2 | USEPA (2006) | 2 | **Yes** | 2 | USEPA (2006) | Yes | **Yes** |
| Silver | 7440-22-4 | 0.2 | B | 0.41 | B | mg/kg | SD-6 (4/30/2007) | N/A | 3/19 | 16% | 0.16 – 0.9 | 0.41 | MDC | 0.73 | USEPA (2006) | 0.6 | No | 0.73 | USEPA (2006) | No | No |
| Sodium | 7440-23-5 | 2830 | | 53700 | | mg/kg | SD-7 (5/2/2007) | N/A | 19/19 | 100% | N/A | 53700 | MDC | See Text - Nutrient | USEPA (2018) | -- | -- | See Text - Nutrient | USEPA (2018) | -- | -- |
| Thallium | 7440-28-0 | 0.15 | B | 0.5 | B | mg/kg | SD-5 (4/30/2007) | N/A | 8/19 | 42% | 2.4 – 4.6 | 0.5 | MDC | N/A | -- | -- | -- | 0.73 | LANL (2017) | No | No |
| Vanadium | 7440-62-2 | 23.9 | | 77 | J | mg/kg | SD19 (8/29/2016) | 0 – 0.5 | 19/19 | 100% | N/A | 77 | MDC | N/A | -- | -- | -- | 29 | LANL (2017) | Yes | **Yes** |
| Zinc | 7440-66-6 | 36.7 | J | 113 | J | mg/kg | SD-2 (5/2/2007) | N/A | 19/19 | 100% | N/A | 113 | MDC | 121 | USEPA (2006) | 0.9 | No | 121 | USEPA (2006) | No | No |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 7**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Surface Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Surface Water
**Exposure Medium:** Surface Water
**Exposure Point:** Surface Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.3 | 0.3 | LOQ | 11 | USEPA (2006) | 0.03 | No | 4400000 | LANL (2017) | No | No |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.8 | 0.8 | LOQ | 90.2 | USEPA (2006) | 0.009 | No | N/A | -- | -- | -- |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 0.49 | 0.49 | LOQ | 550 | USEPA (2006) | 0.0009 | No | N/A | -- | -- | -- |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.69 – 1.2 | 1.2 | LOQ | 0.0013 | USEPA (2017) | 900 | Yes | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.23 | 0.23 | LOQ | 410 | USEPA (2018) | 0.0006 | No | 1700000 | LANL (2017) | No | No |
| 1,1-Dichloroethene | 75-35-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.33 | 0.33 | LOQ | 25 | USEPA (2006) | 0.01 | No | 130000 | LANL (2017) | No | No |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.41 | 0.41 | LOQ | 5.4 | USEPA (2006) | 0.08 | No | 6600 | LANL (2017) | No | No |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.8 – 1.1 | 1.1 | LOQ | 0.00333 | USEPA (2017) | 300 | Yes | N/A | -- | -- | -- |
| 1,2-Dibromoethane | 106-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.45 – 0.52 | 0.52 | LOQ | 0.00839 | USEPA (2017) | 60 | Yes | N/A | -- | -- | -- |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.2 | 0.2 | LOQ | 0.7 | USEPA (2006) | 0.3 | No | 0.7 | USEPA (2006) | No | No |
| 1,2-Dichloroethane | 107-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.29 – 0.29 | 0.29 | LOQ | 100 | USEPA (2006) | 0.003 | No | 19000 | LANL (2017) | No | No |
| 1,2-Dichloropropane | 78-87-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.24 | 0.24 | LOQ | 520 | USEPA (2018) | 0.0005 | No | N/A | -- | -- | -- |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.21 – 0.32 | 0.32 | LOQ | 28.5 | USEPA (2006) | 0.01 | No | 28.5 | USEPA (2006) | No | No |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.17 – 0.24 | 0.24 | LOQ | 19.9 | USEPA (2006) | 0.01 | No | 11000 | LANL (2017) | No | No |
| 2-Butanone (MEK) | 78-93-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 2.6 – 2.7 | 2.7 | LOQ | 22000 | USEPA (2018) | 0.0001 | No | 7900000 | LANL (2017) | No | No |
| 2-Hexanone | 591-78-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.94 – 1.3 | 1.3 | LOQ | 99 | USEPA (2018) | 0.01 | No | N/A | -- | -- | -- |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.1 – 1.4 | 1.4 | LOQ | 170 | USEPA (2006) | 0.008 | No | N/A | -- | -- | -- |
| Acetone | 67-64-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 2.4 – 2.9 | 2.9 | LOQ | 1500 | USEPA (2006) | 0.002 | No | 44000 | LANL (2017) | No | No |
| Benzene | 71-43-2 | 0.77 | J | 0.77 | J | µg/L | SW-02 (12/19/2007) | N/A | 1/7 | 14% | 0.19 – 0.21 | 0.77 | MDC | 110 | USEPA (2006) | 0.007 | No | 110000 | LANL (2017) | No | No |
| Bromodichloromethane | 75-27-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.15 – 0.17 | 0.17 | LOQ | 340 | USEPA (2018) | 0.0005 | No | N/A | -- | -- | -- |
| Bromoform | 75-25-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.54 | 0.54 | LOQ | 320 | USEPA (2006) | 0.002 | No | N/A | -- | -- | -- |
| Bromomethane | 74-83-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.38 | 0.38 | LOQ | 16 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Carbon disulfide | 75-15-0 | 0.24 | J | 0.24 | J | µg/L | SW-02 (12/19/2007) | N/A | 1/7 | 14% | 0.14 – 0.21 | 0.24 | MDC | 0.92 | USEPA (2006) | 0.3 | No | N/A | -- | -- | -- |
| Carbon tetrachloride | 56-23-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.19 – 0.29 | 0.29 | LOQ | 13.3 | USEPA (2006) | 0.02 | No | N/A | -- | -- | -- |
| Chlorobenzene | 108-90-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.19 – 0.22 | 0.22 | LOQ | 1.3 | USEPA (2006) | 0.2 | No | 260000 | LANL (2017) | No | No |
| Chloroethane | 75-00-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.56 – 0.67 | 0.67 | LOQ | 0.00607 | USEPA (2017) | 100 | Yes | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.25 | 0.25 | LOQ | 1.8 | USEPA (2006) | 0.1 | No | 67000 | LANL (2017) | No | No |
| Chloromethane | 74-87-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.3 – 0.35 | 0.35 | LOQ | 0.011 | USEPA (2017) | 30 | Yes | N/A | -- | -- | -- |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.18 – 0.27 | 0.27 | LOQ | 620 | USEPA (2018) | 0.0004 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.13 – 0.15 | 0.15 | LOQ | 0.055 | USEPA (2006) | 3 | Yes | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 0.85 | 0.85 | LOQ | 158 | USEPA (2018) | 0.005 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.19 – 0.28 | 0.28 | LOQ | 34 | USEPA (2018) | 0.008 | No | N/A | -- | -- | -- |
| Dichlorodifluoromethane | 75-71-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.75 – 1 | 1 | LOQ | 0.00755 | USEPA (2017) | 100 | Yes | N/A | -- | -- | -- |
| Ethylbenzene | 100-41-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.21 | 0.21 | LOQ | 25 | USEPA (2006) | 0.008 | No | N/A | -- | -- | -- |
| Hexachlorobutadiene | 87-68-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.13 – 0.21 | 0.21 | LOQ | 0.3 | USEPA (2006) | 0.7 | No | 0.3 | USEPA (2006) | No | No |
| Isopropylbenzene | 98-82-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.54 | 0.54 | LOQ | 2.6 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| m,p-Xylene | 179601-23-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.42 | 0.42 | LOQ | 13 | USEPA (2006) | 0.03 | No | 9400 | LANL (2017) | No | No |
| Methyl acetate | 79-20-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.6 – 2.1 | 2.1 | LOQ | 0.00935 | USEPA (2017) | 200 | Yes | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.31 | 0.31 | LOQ | 730 | USEPA (2018) | 0.0004 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.18 – 0.5 | 0.5 | LOQ | 52 | USEPA (2018) | 0.01 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.21 – 0.27 | 0.27 | LOQ | 98.1 | USEPA (2006) | 0.003 | No | 26000 | LANL (2017) | No | No |
| Naphthalene | 91-20-3 | 1 | J | 1 | J | µg/L | SW-04 (12/19/2007) | N/A | 1/7 | 14% | 0.18 – 0.38 | 1 | MDC | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| o-Xylene | 95-47-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.31 | 0.31 | LOQ | 13 | USEPA (2006) | 0.02 | No | 9400 | LANL (2017) | No | No |
| Styrene | 100-42-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.2 | 0.2 | LOQ | 72 | USEPA (2006) | 0.003 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.28 | 0.28 | LOQ | 45 | USEPA (2006) | 0.006 | No | 8900 | LANL (2017) | No | No |
| Toluene | 108-88-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.21 | 0.21 | LOQ | 2 | USEPA (2006) | 0.1 | No | 110000 | LANL (2017) | No | No |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 0.42 | 0.42 | LOQ | 970 | USEPA (2006) | 0.0004 | No | N/A | -- | -- | -- |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.17 – 0.2 | 0.2 | LOQ | 0.055 | USEPA (2006) | 4 | Yes | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.26 – 0.29 | 0.29 | LOQ | 21 | USEPA (2006) | 0.01 | No | 440000 | LANL (2017) | No | No |
| Trichlorofluoromethane | 75-69-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.25 – 0.26 | 0.26 | LOQ | 0.00501 | USEPA (2017) | 50 | Yes | N/A | -- | -- | -- |

**Table 7**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Surface Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Surface Water
**Exposure Medium:** Surface Water
**Exposure Point:** Surface Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Vinyl chloride | 75-01-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.29 | 0.29 | LOQ | 930 | USEPA (2018) | 0.0003 | No | N/A | -- | -- | -- |
| Xylene (total) | 1330-20-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 0.31 | 0.31 | LOQ | 13 | USEPA (2006) | 0.02 | No | 9400 | LANL (2017) | No | No |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.22 – 0.38 | 0.38 | LOQ | 14 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.1 – 2.3 | 2.3 | LOQ | 12 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 1.5 | 1.5 | LOQ | 4.9 | USEPA (2006) | 0.3 | No | N/A | -- | -- | -- |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.4 – 1.8 | 1.8 | LOQ | 11 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.7 – 1.9 | 1.9 | LOQ | 15 | USEPA (2018) | 0.1 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 1.2 | 1.2 | LOQ | 14 | USEPA (2018) | 0.09 | No | N/A | -- | -- | -- |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.54 – 1 | 1 | LOQ | 44 | USEPA (2006) | 0.02 | No | 14000 | LANL (2017) | No | No |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 0.66 | 0.66 | LOQ | 81 | USEPA (2006) | 0.008 | No | 7900 | LANL (2017) | No | No |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.2 – 1.2 | 1.2 | LOQ | 0.000044 | USEPA (2017) | 30000 | Yes | N/A | -- | -- | -- |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.87 – 1.1 | 1.1 | LOQ | 24 | USEPA (2006) | 0.05 | No | 2200 | LANL (2017) | No | No |
| 2-Methylnaphthalene | 91-57-6 | 1.8 | J | 1.8 | J | µg/L | SW-04 (12/19/2007) | N/A | 1/7 | 14% | 0.46 – 0.84 | 1.8 | MDC | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 1.6 | 1.6 | LOQ | 13 | USEPA (2006) | 0.1 | No | N/A | -- | -- | -- |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 0.78 | 0.78 | LOQ | 17 | USEPA (2018) | 0.05 | No | N/A | -- | -- | -- |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.5 – 2.1 | 2.1 | LOQ | 60 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.1 – 1.5 | 1.5 | LOQ | 62 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.97 – 1.4 | 1.4 | LOQ | 4.5 | USEPA (2006) | 0.3 | No | N/A | -- | -- | -- |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 1.5 | 1.5 | LOQ | 17 | USEPA (2018) | 0.09 | No | N/A | -- | -- | -- |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.81 – 2.5 | 2.5 | LOQ | 0.000426 | USEPA (2017) | 6000 | Yes | N/A | -- | -- | -- |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.41 | 0.41 | LOQ | 0.000063 | USEPA (2017) | 7000 | Yes | 0.000063 | USEPA (2017) | Yes | No |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1.2 – 1.4 | 1.4 | LOQ | 1 | USEPA (2018) | 1 | Yes | N/A | -- | -- | -- |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.47 | 0.47 | LOQ | 0.8 | USEPA (2018) | 0.6 | No | N/A | -- | -- | -- |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.29 – 0.51 | 0.51 | LOQ | 0.000084 | USEPA (2017) | 6000 | Yes | 0.000084 | USEPA (2017) | Yes | No |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.59 – 0.85 | 0.85 | LOQ | 17 | USEPA (2018) | 0.05 | No | N/A | -- | -- | -- |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.95 – 1.7 | 1.7 | LOQ | 60 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| Acenaphthene | 83-32-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.25 – 0.41 | 0.41 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.31 – 0.45 | 0.45 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.36 – 0.44 | 0.44 | LOQ | 0.00958 | USEPA (2017) | 50 | Yes | N/A | -- | -- | -- |
| Anthracene | 120-12-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.33 – 0.47 | 0.47 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.18 – 0.31 | 0.31 | LOQ | 1.8 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.42 | 0.42 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.41 – 0.85 | 0.85 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.66 – 0.82 | 0.82 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.36 – 0.5 | 0.5 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.47 – 0.74 | 0.74 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.32 – 0.77 | 0.77 | LOQ | 0.0272 | USEPA (2017) | 30 | Yes | N/A | -- | -- | -- |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.6 – 0.74 | 0.74 | LOQ | 0.0138 | USEPA (2017) | 50 | Yes | N/A | -- | -- | -- |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.58 – 0.87 | 0.87 | LOQ | 0.00352 | USEPA (2017) | 200 | Yes | N/A | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.74 – 0.96 | 0.96 | LOQ | 16 | USEPA (2006) | 0.06 | No | 4500 | LANL (2017) | No | No |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.64 – 0.7 | 0.7 | LOQ | 19 | USEPA (2006) | 0.04 | No | 710000 | LANL (2017) | No | No |
| Caprolactam | 105-60-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.35 – 0.54 | 0.54 | LOQ | 0.00253 | USEPA (2017) | 200 | Yes | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 4 | USEPA (2018) | 0.1 | No | N/A | -- | -- | -- |
| Chrysene | 218-01-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.49 | 0.49 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.48 – 0.64 | 0.64 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.23 – 0.4 | 0.4 | LOQ | 3.7 | USEPA (2006) | 0.1 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.46 | 0.46 | LOQ | 75.9 | USEPA (2006) | 0.006 | No | N/A | -- | -- | -- |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.39 | 0.39 | LOQ | 1100 | USEPA (2018) | 0.0004 | No | 300000 | LANL (2017) | No | No |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.4 – 0.7 | 0.7 | LOQ | 3.4 | USEPA (2006) | 0.2 | No | 570 | LANL (2017) | No | No |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.48 – 0.67 | 0.67 | LOQ | 215 | USEPA (2018) | 0.003 | No | 290000 | LANL (2017) | No | No |

**Table 7**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Surface Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Surface Water
**Exposure Medium:** Surface Water
**Exposure Point:** Surface Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Fluoranthene | 206-44-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.39 | 0.39 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Fluorene | 86-73-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.36 – 0.53 | 0.53 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.31 – 0.63 | 0.63 | LOQ | 0.0003 | USEPA (2006) | 2000 | Yes | 0.0003 | USEPA (2006) | Yes | No |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.1 – 0.48 | 0.48 | LOQ | 0.07 | USEPA (2006) | 7 | Yes | 0.07 | USEPA (2006) | Yes | No |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.33 | 0.33 | LOQ | 9.4 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.34 – 0.87 | 0.87 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.49 – 0.69 | 0.69 | LOQ | 920 | USEPA (2018) | 0.0008 | No | N/A | -- | -- | -- |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.47 – 0.77 | 0.77 | LOQ | 66.8 | USEPA (2006) | 0.01 | No | 26000 | LANL (2017) | No | No |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.38 – 0.55 | 0.55 | LOQ | 0.000582 | USEPA (2017) | 900 | Yes | N/A | -- | -- | -- |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.41 – 0.61 | 0.61 | LOQ | 210 | USEPA (2006) | 0.003 | No | N/A | -- | -- | -- |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.93 – 2.2 | 2.2 | LOQ | 0.5 | USEPA (2006) | 4 | Yes | 1000 | LANL (2017) | No | No |
| Phenanthrene | 85-01-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.28 – 0.43 | 0.43 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.56 – 0.75 | 0.75 | LOQ | 4 | USEPA (2006) | 0.2 | No | 260000 | LANL (2017) | No | No |
| Pyrene | 129-00-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.37 – 0.41 | 0.41 | LOQ | See Total PAHs | -- | -- | -- | See Total PAHs | -- | -- | -- |
| Total PAHs | T-PAH | 0 | | 0 | | µg/L | SW-04 (12/19/2007) | N/A | 1/7 | 14% | N/A | 0 | MDC | 0.015 | USEPA (2006) | #NUM! | -- | 0.015 | USEPA (2006) | No | No |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 72-54-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0024 – 0.0028 | 0.0028 | LOQ | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| 4,4'-DDE | 72-55-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.0019 | 0.0019 | LOQ | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| 4,4'-DDT | 50-29-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0049 – 0.0057 | 0.0057 | LOQ | See Total | USEPA (2006) | -- | -- | See Total | USEPA (2006) | -- | -- |
| Aldrin | 309-00-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0033 – 0.0039 | 0.0039 | LOQ | 0.13 | USEPA (2006) | 0.03 | No | 0.13 | USEPA (2006) | No | No |
| alpha-BHC | 319-84-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0026 – 0.003 | 0.003 | LOQ | 25 | USEPA (2006) | 0.0001 | No | 25 | USEPA (2006) | No | No |
| alpha-Chlordane | 5103-71-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0044 – 0.0051 | 0.0051 | LOQ | 0.004 | USEPA (2018) | 1 | Yes | 5200 | LANL (2017) | No | No |
| beta-BHC | 319-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0062 – 0.0072 | 0.0072 | LOQ | 0.01 | USEPA (2018) | 0.7 | No | 1700 | LANL (2017) | No | No |
| delta-BHC | 319-86-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0031 – 0.0036 | 0.0036 | LOQ | 141 | USEPA (2006) | 0.00003 | No | 1700 | LANL (2017) | No | No |
| Dieldrin | 60-57-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.002 | 0.002 | LOQ | 0.056 | USEPA (2006) | 0.04 | No | 89 | LANL (2017) | No | No |
| Endosulfan sulfate | 1031-07-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0046 – 0.0054 | 0.0054 | LOQ | 0.009 | USEPA (2006) | 0.6 | No | N/A | -- | -- | -- |
| Endosulfan-I | 959-98-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0021 – 0.0025 | 0.0025 | LOQ | 0.051 | USEPA (2006) | 0.05 | No | 0.051 | USEPA (2006) | No | No |
| Endosulfan-II | 33213-65-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0032 – 0.0038 | 0.0038 | LOQ | 0.051 | USEPA (2006) | 0.07 | No | 0.051 | USEPA (2006) | No | No |
| Endrin | 72-20-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.003 – 0.0035 | 0.0035 | LOQ | 0.01 | USEPA (2006) | 0.4 | No | 41 | LANL (2017) | No | No |
| Endrin aldehyde | 7421-93-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0064 – 0.0075 | 0.0075 | LOQ | 0.01 | USEPA (2006) | 0.8 | No | 41 | LANL (2017) | No | No |
| Endrin ketone | 53494-70-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0035 – 0.0041 | 0.0041 | LOQ | 0.01 | USEPA (2006) | 0.4 | No | 41 | LANL (2017) | No | No |
| gamma-BHC (Lindane) | 58-89-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.002 | 0.002 | LOQ | 0.01 | USEPA (2006) | 0.2 | No | 62 | LANL (2017) | No | No |
| gamma-Chlordane | 5103-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0017 – 0.002 | 0.002 | LOQ | 0.004 | USEPA (2018) | 0.5 | No | 5200 | LANL (2017) | No | No |
| Heptachlor | 76-44-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0026 – 0.003 | 0.003 | LOQ | 0.0019 | USEPA (2006) | 2 | Yes | 440 | LANL (2017) | No | No |
| Heptachlor epoxide | 1024-57-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0015 – 0.0017 | 0.0017 | LOQ | 0.0019 | USEPA (2006) | 0.9 | No | 0.0019 | USEPA (2006) | No | No |
| Methoxychlor | 72-43-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.0068 – 0.0079 | 0.0079 | LOQ | 0.019 | USEPA (2006) | 0.4 | No | 17000 | LANL (2017) | No | No |
| Toxaphene | 8001-35-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.094 – 0.11 | 0.11 | LOQ | 0.0002 | USEPA (2006) | 600 | Yes | 35000 | LANL (2017) | No | No |
| Total DDD/DDE/DDT | TOT-DDT | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | N/A | N/A | -- | 0.000011 | USEPA (2006) | -- | -- | 0.000011 | USEPA (2006) | No | No |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | 12674-11-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.094 – 0.11 | 0.11 | LOQ | 0.000074 | USEPA (2006) | 1000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| Aroclor 1221 | 11104-28-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.47 – 0.55 | 0.55 | LOQ | 0.000074 | USEPA (2006) | 7000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| Aroclor 1232 | 11141-16-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.39 – 0.45 | 0.45 | LOQ | 0.000074 | USEPA (2006) | 6000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| Aroclor 1242 | 53469-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.16 – 0.19 | 0.19 | LOQ | 0.000074 | USEPA (2006) | 3000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| Aroclor 1248 | 12672-29-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.15 – 0.18 | 0.18 | LOQ | 0.000074 | USEPA (2006) | 2000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| Aroclor 1254 | 11097-69-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.11 – 0.13 | 0.13 | LOQ | 0.000074 | USEPA (2006) | 2000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| Aroclor 1260 | 11096-82-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.12 – 0.14 | 0.14 | LOQ | 0.000074 | USEPA (2006) | 2000 | Yes | 0.000074 | USEPA (2006) | Yes | No |
| **Dioxins and Furans** | | | | | | | | | | | | | | | | | | | | | |
| **Total Cyanide** | | | | | | | | | | | | | | | | | | | | | |
| Cyanide | 57-12-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 10000 – 10000 | 10000 | LOQ | 1 | USEPA (2006) | 10000 | Yes | 160 | LANL (2017) | Yes | No |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | 106 | B | 1060 | | µg/L | SW-02 (12/19/2007) | N/A | 7/7 | 100% | N/A | 1060 | MDC | 87 | USEPA (2006) | 10 | Yes | 8600 | LANL (2017) | No | No |

**Table 7**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Surface Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Surface Water
**Exposure Medium:** Surface Water
**Exposure Point:** Surface Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Antimony | 7440-36-0 | 6.2 | | 6.2 | | µg/L | SW-03 (5/1/2007) | N/A | 1/7 | 14% | 5 – 11 | 6.2 | MDC | 30 | USEPA (2006) | 0.2 | No | 690 | LANL (2017) | No | No |
| Arsenic | 7440-38-2 | 7 | | 11.7 | | µg/L | SW-04 (5/1/2007) | N/A | 7/7 | 100% | N/A | 11.7 | MDC | 5 | USEPA (2006) | 2 | Yes | 5 | USEPA (2006) | Yes | Yes |
| Barium | 7440-39-3 | 14.4 | B | 27.6 | B | µg/L | SW-02 (5/1/2007) | N/A | 7/7 | 100% | N/A | 27.6 | MDC | 4 | USEPA (2006) | 7 | Yes | 6100 | LANL (2017) | No | No |
| Beryllium | 7440-41-7 | 0.4 | U | 0.52 | B | µg/L | SW-03 (5/1/2007) | N/A | 3/7 | 43% | 0.15 – 0.4 | 0.52 | MDC | 0.66 | USEPA (2006) | 0.8 | No | 2900 | LANL (2017) | No | No |
| Cadmium | 7440-43-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.5 – 1.3 | 1.3 | LOQ | 0.12 | USEPA (2006) | 10 | Yes | 0.12 | USEPA (2006) | Yes | No |
| Calcium | 7440-70-2 | 230000 | | 266000 | | µg/L | SW-03 (12/19/2007) | N/A | 7/7 | 100% | N/A | 266000 | MDC | 116000 | USEPA (2006) | 2 | Yes | N/A | -- | -- | -- |
| Chromium | 7440-47-3 | 0.86 | B | 2 | B | µg/L | SW-03 (5/1/2007) | N/A | 3/7 | 43% | 0.8 – 9 | 2 | MDC | 1.5 | USEPA (2006) | 1 | Yes | 1.5 | USEPA (2006) | Yes | Yes |
| Cobalt | 7440-48-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.87 – 1.8 | 1.8 | LOQ | 23 | USEPA (2006) | 0.08 | No | 82 | LANL (2017) | No | No |
| Copper | 7440-50-8 | 3.3 | B | 4.9 | B | µg/L | SW-02 (12/19/2007) | N/A | 3/7 | 43% | 2.7 – 2.7 | 4.9 | MDC | 3.1 | USEPA (2006) | 2 | Yes | 3.1 | USEPA (2006) | Yes | Yes |
| Iron | 7439-89-6 | 228 | | 1030 | | µg/L | SW-02 (12/19/2007) | N/A | 7/7 | 100% | N/A | 1030 | MDC | 300 | USEPA (2006) | 3 | Yes | N/A | -- | -- | -- |
| Lead | 7439-92-1 | 3.1 | B | 4 | B | µg/L | SW-04 (12/19/2007) | N/A | 2/7 | 29% | 2.8 – 3 | 4 | MDC | 2.5 | USEPA (2006) | 2 | Yes | 2.5 | USEPA (2006) | Yes | Yes |
| Magnesium | 7439-95-4 | 721000 | | 1060000 | | µg/L | SW-03 (12/19/2007) | N/A | 7/7 | 100% | N/A | 1060000 | MDC | 82000 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Manganese | 7439-96-5 | 20.9 | | 43.5 | | µg/L | SW-03 (5/1/2007) | N/A | 7/7 | 100% | N/A | 43.5 | MDC | 120 | USEPA (2006) | 0.4 | No | 190000 | LANL (2017) | No | No |
| Mercury | 7439-97-6 | 0.066 | B | 0.091 | B | µg/L | Multiple Locations | N/A | 3/7 | 43% | 0.037 – 0.15 | 0.091 | MDC | 0.016 | USEPA (2006) | 6 | Yes | 0.016 | USEPA (2006) | Yes | Yes |
| Nickel | 7440-02-0 | 2.9 | B | 2.9 | B | µg/L | SW-03 (5/1/2007) | N/A | 1/7 | 14% | 2.8 – 4.2 | 2.9 | MDC | 8.2 | USEPA (2006) | 0.4 | No | 8.2 | USEPA (2006) | No | No |
| Potassium | 7440-09-7 | 330000 | | 457000 | | µg/L | SW-04 (5/1/2007) | N/A | 7/7 | 100% | N/A | 457000 | MDC | 53000 | USEPA (2006) | 9 | Yes | N/A | -- | -- | -- |
| Selenium | 7782-49-2 | 6.6 | B | 11.8 | | µg/L | SW-04 (12/19/2007) | N/A | 7/7 | 100% | N/A | 11.8 | MDC | 1 | USEPA (2006) | 10 | Yes | 1 | USEPA (2006) | Yes | Yes |
| Silver | 7440-22-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 1 – 2.6 | 2.6 | LOQ | 0.23 | USEPA (2006) | 10 | Yes | 0.23 | USEPA (2006) | Yes | No |
| Sodium | 7440-23-5 | 7010000 | J | 9190000 | | µg/L | SW-03 (12/19/2007) | N/A | 7/7 | 100% | N/A | 9190000 | MDC | 680000 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Thallium | 7440-28-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 0.48 – 2.4 | 2.4 | LOQ | 0.8 | USEPA (2006) | 3 | Yes | 31 | LANL (2017) | No | No |
| Vanadium | 7440-62-2 | 2.7 | B | 4.4 | B | µg/L | SW-02 (12/19/2007) | N/A | 3/7 | 43% | 1.8 – 1.8 | 4.4 | MDC | 20 | USEPA (2006) | 0.2 | No | 4500 | LANL (2017) | No | No |
| Zinc | 7440-66-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/7 | 0% | 2.9 – 3.4 | 3.4 | LOQ | 81 | USEPA (2006) | 0.04 | No | 81 | USEPA (2006) | No | No |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
mg/kg = milligram per kilogram
N/A = Not Applicable
ND = Non-Detect or Not Detected
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

**Table 8**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Pore Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Pore Water
**Exposure Medium:** Pore Water
**Exposure Point:** Pore Water

| Chemical | CASRN | Minimum Detected Concentration | Maximum Detected Concentration | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 71-55-6 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 11 | USEPA (2006) | 0.07 | No | N/A | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 90.2 | USEPA (2006) | 0.009 | No | N/A | -- | -- | -- |
| 1,1,2-Trichloroethane | 79-00-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 550 | USEPA (2006) | 0.001 | No | N/A | -- | -- | -- |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 76-13-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.0013 | USEPA (2017) | 600 | Yes | N/A | -- | -- | -- |
| 1,1-Dichloroethane | 75-34-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 410 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| 1,1-Dichloroethene | 75-35-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 25 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| 1,2,4-Trichlorobenzene | 120-82-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 5.4 | USEPA (2006) | 0.1 | No | N/A | -- | -- | -- |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.00333 | USEPA (2017) | 200 | Yes | N/A | -- | -- | -- |
| 1,2-Dibromoethane | 106-93-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.00839 | USEPA (2017) | 100 | Yes | N/A | -- | -- | -- |
| 1,2-Dichlorobenzene | 95-50-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.7 | USEPA (2006) | 1 | Yes | N/A | -- | -- | -- |
| 1,2-Dichloroethane | 107-06-2 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 100 | USEPA (2006) | 0.008 | No | N/A | -- | -- | -- |
| 1,2-Dichloropropane | 78-87-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 520 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| 1,3-Dichlorobenzene | 541-73-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 28.5 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| 1,4-Dichlorobenzene | 106-46-7 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 19.9 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| 2-Butanone (MEK) | 78-93-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4 | 4 | LOQ | 22000 | USEPA (2018) | 0.0002 | No | N/A | -- | -- | -- |
| 2-Hexanone | 591-78-6 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4 | 4 | LOQ | 99 | USEPA (2018) | 0.04 | No | N/A | -- | -- | -- |
| 4-Methyl-2-pentanone (MIBK) | 108-10-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4 | 4 | LOQ | 170 | USEPA (2006) | 0.02 | No | N/A | -- | -- | -- |
| Acetone | 67-64-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4 | 4 | LOQ | 1500 | USEPA (2006) | 0.003 | No | N/A | -- | -- | -- |
| Benzene | 71-43-2 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 110 | USEPA (2006) | 0.007 | No | N/A | -- | -- | -- |
| Bromodichloromethane | 75-27-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 340 | USEPA (2018) | 0.002 | No | N/A | -- | -- | -- |
| Bromoform | 75-25-2 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 320 | USEPA (2006) | 0.003 | No | N/A | -- | -- | -- |
| Bromomethane | 74-83-9 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 16 | USEPA (2018) | 0.05 | No | N/A | -- | -- | -- |
| Carbon disulfide | 75-15-0 | 1.8 | 23 | µg/L | PW21 (8/26/2016) | 1 – 1 | 4/11 | 36% | 0.8 – 0.8 | 23 | MDC | 0.92 | USEPA (2006) | 30 | Yes | N/A | -- | -- | -- |
| Carbon tetrachloride | 56-23-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 13.3 | USEPA (2006) | 0.06 | No | N/A | -- | -- | -- |
| Chlorobenzene | 108-90-7 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 1.3 | USEPA (2006) | 0.6 | No | N/A | -- | -- | -- |
| Chloroethane | 75-00-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.00607 | USEPA (2017) | 100 | Yes | N/A | -- | -- | -- |
| Chloroform | 67-66-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 1.8 | USEPA (2006) | 0.4 | No | N/A | -- | -- | -- |
| Chloromethane | 74-87-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.011 | USEPA (2017) | 70 | Yes | N/A | -- | -- | -- |
| cis-1,2-Dichloroethene | 156-59-2 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 620 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| cis-1,3-Dichloropropene | 10061-01-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.055 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Cyclohexane | 110-82-7 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 158 | USEPA (2018) | 0.005 | No | N/A | -- | -- | -- |
| Dibromochloromethane | 124-48-1 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 34 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Dichlorodifluoromethane | 75-71-8 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.00755 | USEPA (2017) | 100 | Yes | N/A | -- | -- | -- |
| Ethylbenzene | 100-41-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 25 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| Hexachlorobutadiene | 87-68-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.3 | USEPA (2006) | 1 | Yes | N/A | -- | -- | -- |
| Isopropylbenzene | 98-82-8 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 2.6 | USEPA (2006) | 0.3 | No | N/A | -- | -- | -- |
| Methyl acetate | 79-20-9 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.00935 | USEPA (2017) | 90 | Yes | N/A | -- | -- | -- |
| Methyl Tert Butyl Ether | 1634-04-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 730 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Methylcyclohexane | 108-87-2 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 52 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Methylene chloride | 75-09-2 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 98.1 | USEPA (2006) | 0.008 | No | N/A | -- | -- | -- |
| Naphthalene | 91-20-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Styrene | 100-42-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 72 | USEPA (2006) | 0.01 | No | N/A | -- | -- | -- |
| Tetrachloroethene | 127-18-4 | 5.3 | 5.3 | µg/L | PW17 (8/30/2016) | 1 – 1 | 1/11 | 9% | 0.8 – 0.8 | 5.3 | MDC | 45 | USEPA (2006) | 0.1 | No | N/A | -- | -- | -- |
| Toluene | 108-88-3 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 2 | USEPA (2006) | 0.4 | No | N/A | -- | -- | -- |
| trans-1,2-Dichloroethene | 156-60-5 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 970 | USEPA (2006) | 0.0008 | No | N/A | -- | -- | -- |
| trans-1,3-Dichloropropene | 10061-02-6 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.055 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Trichloroethene | 79-01-6 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 21 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| Trichlorofluoromethane | 75-69-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 0.00501 | USEPA (2017) | 200 | Yes | N/A | -- | -- | -- |
| Vinyl chloride | 75-01-4 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 930 | USEPA (2018) | 0.0009 | No | N/A | -- | -- | -- |
| Xylene (total) | 1330-20-7 | N/A | N/A | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.8 | 0.8 | LOQ | 13 | USEPA (2006) | 0.06 | No | N/A | -- | -- | -- |

**Table 8**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Pore Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Pore Water
**Exposure Medium:** Pore Water
**Exposure Point:** Pore Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | | | | | | | | | | |
| 1,1'-Biphenyl | 92-52-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 14 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| 2,4,5-Trichlorophenol | 95-95-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 12 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| 2,4,6-Trichlorophenol | 88-06-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 4.9 | USEPA (2006) | 0.09 | No | N/A | -- | -- | -- |
| 2,4-Dichlorophenol | 120-83-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 11 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| 2,4-Dimethylphenol | 105-67-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 15 | USEPA (2018) | 0.06 | No | N/A | -- | -- | -- |
| 2,4-Dinitrophenol | 51-28-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.2 – 3.6 | 3.6 | LOQ | 14 | USEPA (2018) | 0.3 | No | N/A | -- | -- | -- |
| 2,4-Dinitrotoluene | 121-14-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 1 – 1.1 | 1.1 | LOQ | 44 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| 2,6-Dinitrotoluene | 606-20-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 1 – 1.1 | 1.1 | LOQ | 81 | USEPA (2006) | 0.01 | No | N/A | -- | -- | -- |
| 2-Chloronaphthalene | 91-58-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.000044 | USEPA (2017) | 10000 | Yes | N/A | -- | -- | -- |
| 2-Chlorophenol | 95-57-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 24 | USEPA (2006) | 0.02 | No | N/A | -- | -- | -- |
| 2-Methylnaphthalene | 91-57-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.1 – 0.11 | 0.11 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| 2-Methylphenol | 95-48-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 13 | USEPA (2006) | 0.03 | No | N/A | -- | -- | -- |
| 2-Nitroaniline | 88-74-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 1.6 – 1.8 | 1.8 | LOQ | 17 | USEPA (2018) | 0.1 | No | N/A | -- | -- | -- |
| 2-Nitrophenol | 88-75-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 60 | USEPA (2006) | 0.01 | No | N/A | -- | -- | -- |
| 3&4-Methylphenol | 15831-10-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 2 – 2.2 | 2.2 | LOQ | 62 | USEPA (2018) | 0.04 | No | N/A | -- | -- | -- |
| 3,3'-Dichlorobenzidine | 91-94-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 2 – 2.2 | 2.2 | LOQ | 4.5 | USEPA (2006) | 0.5 | No | N/A | -- | -- | -- |
| 3-Nitroaniline | 99-09-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 1.6 – 1.8 | 1.8 | LOQ | 17 | USEPA (2018) | 0.1 | No | N/A | -- | -- | -- |
| 4,6-Dinitro-o-cresol | 534-52-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 0.000426 | USEPA (2017) | 10000 | Yes | N/A | -- | -- | -- |
| 4-Bromophenyl phenyl ether | 101-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.000063 | USEPA (2017) | 7000 | Yes | N/A | -- | -- | -- |
| 4-Chloro-3-methyl phenol | 59-50-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 1 | USEPA (2018) | 0.9 | No | N/A | -- | -- | -- |
| 4-Chloroaniline | 106-47-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.8 | USEPA (2018) | 0.6 | No | N/A | -- | -- | -- |
| 4-Chlorophenyl phenyl ether | 7005-72-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.000084 | USEPA (2017) | 5000 | Yes | N/A | -- | -- | -- |
| 4-Nitroaniline | 100-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 1.6 – 1.8 | 1.8 | LOQ | 17 | USEPA (2018) | 0.1 | No | N/A | -- | -- | -- |
| 4-Nitrophenol | 100-02-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 2 – 2.2 | 2.2 | LOQ | 60 | USEPA (2006) | 0.04 | No | N/A | -- | -- | -- |
| Acenaphthene | 83-32-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Acenaphthylene | 208-96-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Acetophenone | 98-86-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 0.00958 | USEPA (2017) | 90 | Yes | N/A | -- | -- | -- |
| Anthracene | 120-12-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Atrazine | 1912-24-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 1.8 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| Benzaldehyde | 100-52-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 2 – 2.2 | 2.2 | LOQ | 143 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Benzo(a)anthracene | 56-55-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Benzo(a)pyrene | 50-32-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Benzo(b)fluoranthene | 205-99-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Benzo(g,h,i)perylene | 191-24-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Benzo(k)fluoranthene | 207-08-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| bis(2-Chloroethoxy)methane | 111-91-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.0272 | USEPA (2017) | 20 | Yes | N/A | -- | -- | -- |
| bis(2-Chloroethyl)ether | 111-44-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.0138 | USEPA (2017) | 30 | Yes | N/A | -- | -- | -- |
| bis(2-Chloroisopropyl)ether | 108-60-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 0.00352 | USEPA (2017) | 100 | Yes | N/A | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 0.73 | J | 0.75 | J | µg/L | PW18 (8/30/2016) | 1 – 1 | 2/11 | 18% | 4 – 4.5 | 0.75 | MDC | 16 | USEPA (2006) | 0.05 | No | N/A | -- | -- | -- |
| Butyl benzyl phthalate | 85-68-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 19 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| Caprolactam | 105-60-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 0.00253 | USEPA (2017) | 2000 | Yes | N/A | -- | -- | -- |
| Carbazole | 86-74-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 4 | USEPA (2018) | 0.2 | No | N/A | -- | -- | -- |
| Chrysene | 218-01-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Dibenzo(a,h)anthracene | 53-70-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Dibenzofuran | 132-64-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 3.7 | USEPA (2006) | 0.1 | No | N/A | -- | -- | -- |
| Diethyl phthalate | 84-66-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 75.9 | USEPA (2006) | 0.06 | No | N/A | -- | -- | -- |
| Dimethyl phthalate | 131-11-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 1100 | USEPA (2018) | 0.004 | No | N/A | -- | -- | -- |
| Di-n-butyl phthalate | 84-74-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 3.4 | USEPA (2006) | 1 | Yes | N/A | -- | -- | -- |
| Di-n-octyl phthalate | 117-84-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 4 – 4.5 | 4.5 | LOQ | 215 | USEPA (2018) | 0.02 | No | N/A | -- | -- | -- |
| Fluoranthene | 206-44-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |

**Table 8**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Pore Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Pore Water
**Exposure Medium:** Pore Water
**Exposure Point:** Pore Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Fluorene | 86-73-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Hexachlorobenzene | 118-74-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 0.0003 | USEPA (2006) | 3000 | Yes | N/A | -- | -- | -- |
| Hexachlorocyclopentadiene | 77-47-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.2 – 3.6 | 3.6 | LOQ | 0.07 | USEPA (2006) | 50 | Yes | N/A | -- | -- | -- |
| Hexachloroethane | 67-72-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 9.4 | USEPA (2006) | 0.05 | No | N/A | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Isophorone | 78-59-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 920 | USEPA (2018) | 0.001 | No | N/A | -- | -- | -- |
| Nitrobenzene | 98-95-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 66.8 | USEPA (2006) | 0.007 | No | N/A | -- | -- | -- |
| n-Nitroso-di-n-propylamine | 621-64-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.8 – 0.88 | 0.88 | LOQ | 0.000582 | USEPA (2017) | 2000 | Yes | N/A | -- | -- | -- |
| n-Nitrosodiphenylamine | 86-30-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.92 – 1 | 1 | LOQ | 210 | USEPA (2006) | 0.005 | No | N/A | -- | -- | -- |
| Pentachlorophenol | 87-86-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 1.5 – 1.7 | 1.7 | LOQ | 0.5 | USEPA (2006) | 3 | Yes | N/A | -- | -- | -- |
| Phenanthrene | 85-01-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Phenol | 108-95-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.4 – 0.44 | 0.44 | LOQ | 4 | USEPA (2006) | 0.1 | No | N/A | -- | -- | -- |
| Pyrene | 129-00-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 0.16 – 0.18 | 0.18 | LOQ | See Total PAHs | -- | -- | -- | N/A | -- | -- | -- |
| Total PAHs | T-PAH | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | N/A | N/A | -- | 0.015 | USEPA (2006) | -- | -- | N/A | -- | -- | -- |
| **Dioxins and Furans** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin | 35822-46-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,4,6,7,8-HPCDF | 67562-39-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,4,7,8,9-HPCDF | 55673-89-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin | 39227-28-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,4,7,8-HXCDF | 70648-26-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin | 57653-85-7 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,6,7,8-HXCDF | 57117-44-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin | 19408-74-3 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,7,8,9-HXCDF | 72918-21-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran | 57117-41-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin | 40321-76-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 2,3,4,6,7,8-HXCDF | 60851-34-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 2,3,4,7,8-PECDF | 57117-31-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 3.34E-11 – 3.95E-11 | 3.95E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 2,3,7,8-TCDD | 1746-01-6 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 6.66E-12 – 7.87E-12 | 7.87E-12 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran | 51207-31-9 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 6.66E-12 – 7.87E-12 | 7.87E-12 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| OCDD | 3268-87-9 | 0.000035 | J | 0.000151 | | µg/L | PW19 (8/29/2016) | 1 – 1 | 7/11 | 64% | 6.66E-11 – 7.87E-11 | 0.000151 | MDC | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| OCDF | 39001-02-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 6.66E-11 – 7.87E-11 | 7.87E-11 | LOQ | See TEQ | USEPA (2018) | -- | -- | N/A | -- | -- | -- |
| Total TEQ (Bird) | TEQ-BIRD | 0 | | 0 | | µg/L | Multiple Locations | N/A | 7/11 | 64% | N/A | 0 | MDC | N/A | -- | -- | -- | N/A | -- | -- | -- |
| Total TEQ (Mammal) | TEQ-MAMMAL | 0 | | 0 | | µg/L | Multiple Locations | N/A | 7/11 | 64% | N/A | 0 | MDC | N/A | -- | -- | -- | N/A | -- | -- | -- |
| Total TEQ (Fish) | TEQ-FISH | 0 | | 0 | | µg/L | Multiple Locations | N/A | 7/11 | 64% | N/A | 0 | MDC | 3.1E-09 | USEPA (2006) | #NUM! | -- | N/A | -- | -- | -- |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 7429-90-5 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 200000 – 200000 | 200000 | LOQ | 87 | USEPA (2006) | 2000 | Yes | N/A | -- | -- | -- |
| Antimony | 7440-36-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 15000 – 15000 | 15000 | LOQ | 30 | USEPA (2006) | 500 | Yes | N/A | -- | -- | -- |
| Arsenic | 7440-38-2 | 6.3 | J | 36 | | µg/L | PW17 (8/30/2016) | 1 – 1 | 11/11 | 100% | N/A | 36 | MDC | 5 | USEPA (2006) | 7 | Yes | N/A | -- | -- | -- |
| Barium | 7440-39-3 | 14 | J | 52 | | µg/L | PW14 (8/24/2016) | 1 – 1 | 11/11 | 100% | N/A | 52 | MDC | 4 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Beryllium | 7440-41-7 | 0.22 | J | 0.28 | J | µg/L | PW21 (8/26/2016) | 1 – 1 | 4/11 | 36% | 2500 – 2500 | 0.28 | MDC | 0.66 | USEPA (2006) | 0.4 | No | N/A | -- | -- | -- |
| Cadmium | 7440-43-9 | 0.6 | J | 1.2 | J | µg/L | Multiple Locations | N/A | 8/11 | 73% | 2500 – 2500 | 1.2 | MDC | 0.12 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Calcium | 7440-70-2 | 290000 | B | 360000 | B | µg/L | Multiple Locations | N/A | 11/11 | 100% | N/A | 360000 | MDC | 116000 | USEPA (2006) | 3 | Yes | N/A | -- | -- | -- |
| Chromium | 7440-47-3 | 1.2 | J | 3.4 | J | µg/L | PW18 (8/30/2016) | 1 – 1 | 7/11 | 64% | 5000 – 5000 | 3.4 | MDC | 1.5 | USEPA (2006) | 2 | Yes | N/A | -- | -- | -- |
| Cobalt | 7440-48-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 13000 – 13000 | 13000 | LOQ | 23 | USEPA (2006) | 600 | Yes | N/A | -- | -- | -- |
| Copper | 7440-50-8 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 5000 – 5000 | 5000 | LOQ | 3.1 | USEPA (2006) | 2000 | Yes | N/A | -- | -- | -- |
| Iron | 7439-89-6 | 42 | J | 180 | | µg/L | PW13 (8/24/2016) | 1 – 1 | 7/11 | 64% | 80000 – 80000 | 180 | MDC | 300 | USEPA (2006) | 0.6 | No | N/A | -- | -- | -- |
| Lead | 7439-92-1 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 9000 – 9000 | 9000 | LOQ | 2.5 | USEPA (2006) | 4000 | Yes | N/A | -- | -- | -- |
| Magnesium | 7439-95-4 | 900000 | B | 1200000 | | µg/L | Multiple Locations | N/A | 11/11 | 100% | N/A | 1200000 | MDC | 82000 | USEPA (2006) | 10 | Yes | N/A | -- | -- | -- |
| Manganese | 7439-96-5 | 34 | | 140 | B | µg/L | PW13 (8/24/2016) | 1 – 1 | 11/11 | 100% | N/A | 140 | MDC | 120 | USEPA (2006) | 1 | Yes | N/A | -- | -- | -- |
| Mercury | 7439-97-6 | 0.03 | J | 0.03 | J | µg/L | PW18 (8/30/2016) | 1 – 1 | 1/11 | 9% | 100 – 100 | 0.03 | MDC | 0.016 | USEPA (2006) | 2 | Yes | N/A | -- | -- | -- |

**Table 8**
**Direct Contact Evaluation and Preliminary Wildlife Screening (Downgradient Estuarine; Pore Water)**
**Reasonable Maximum Exposure**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Scenario Timeframe:** Current and Future
**Medium:** Pore Water
**Exposure Medium:** Pore Water
**Exposure Point:** Pore Water

| Chemical | CASRN | Minimum Detected Concentration | | Maximum Detected Concentration | | Units | Location of Maximum | Depth (ft bgs) | Detection Frequency | | Range of Detection Limits (1) | Exposure Point Concentration (EPC) | | Direct Contact (DC) | | | | Wildlife (WL) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | ESV | Source | HQ | COPEC | ESV | Source | EPC Exceed ESV? | Proceed to DRM? (2) |
| Nickel | 7440-02-0 | 3.1 | J | 3.8 | J | µg/L | PW16 (8/30/2016) | 1 – 1 | 4/11 | 36% | 8000 – 8000 | 3.8 | MDC | 8.2 | USEPA (2006) | 0.5 | No | N/A | -- | -- | -- |
| Potassium | 7440-09-7 | 330000 | | 500000 | | µg/L | PW18 (8/30/2016) | 1 – 1 | 11/11 | 100% | N/A | 500000 | MDC | 53000 | USEPA (2006) | 9 | Yes | N/A | -- | -- | -- |
| Selenium | 7782-49-2 | N/A | | N/A | | µg/L | N/A | N/A | 0/9 | 0% | 17000 – 17000 | 17000 | LOQ | 1 | USEPA (2006) | 20000 | Yes | N/A | -- | -- | -- |
| Silver | 7440-22-4 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 5000 – 5000 | 5000 | LOQ | 0.23 | USEPA (2006) | 20000 | Yes | N/A | -- | -- | -- |
| Sodium | 7440-23-5 | 7500000 | J | 22000000 | | µg/L | PW18 (8/30/2016) | 1 – 1 | 11/11 | 100% | N/A | 22000000 | MDC | 680000 | USEPA (2006) | 30 | Yes | N/A | -- | -- | -- |
| Thallium | 7440-28-0 | N/A | | N/A | | µg/L | N/A | N/A | 0/11 | 0% | 25000 – 25000 | 25000 | LOQ | 0.8 | USEPA (2006) | 30000 | Yes | N/A | -- | -- | -- |
| Vanadium | 7440-62-2 | 2.7 | J | 4.2 | J | µg/L | PW14 (8/24/2016) | 1 – 1 | 7/11 | 64% | 25000 – 25000 | 4.2 | MDC | 20 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |
| Zinc | 7440-66-6 | 3.4 | J | 13 | J | µg/L | PW18 (8/30/2016) | 1 – 1 | 2/11 | 18% | 10000 – 10000 | 13 | MDC | 81 | USEPA (2006) | 0.2 | No | N/A | -- | -- | -- |

**Notes:**

% = Percent
CASRN = Chemical Abstracts Service Registry Number
COPEC = Chemical of Potential Ecological Concern
ft bgs = feet below gound surface
J = Estimated Concentration
LOQ = Limit of Quantiation
MDC = Maximum Detected Concentration
N/A = Not Applicable
ND = Non-Detect or Not Detected
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency

(1) Detection limits are adjusted by their laboratory dilution factors to provide the undiluted LOQ.
(2) Chemicals with a 0% frequency of detect will not be retained for wildlife food chain/dose rate modeling; uncertainty due to LOQs exceeding wildlife-based ESVs will be discussed within the text.

# Attachment B

## Dose Rate Models and Toxicity Reference Values

**Table 1**
**Life History Parameters and Ingestion Rates**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Representative Species | | | Home Range (ha) | Home Range Reference | Area Use Factor (AUF) | Body Weight (kg wet weight) | Dietary Composition | | | | | Ingestion Rates | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Food | | Water | | Substrate | | |
| Common Name | Scientific Name | Food-web classification | | | | | Plant Material | Invert. | Small Mammals | Fish | References | kg dry weight/day | Reference | Liters/day | Reference | % of Dry Intake | kg dry weight/day | Reference |
| **Avian Receptors** | | | | | | | | | | | | | | | | | | |
| Northern bobwhite | *Colinus virginianus* | Terrestrial herbivore | 50.9 | DeGraaf and Rudis (1992) | 1 | 0.15 | 100% | | | | USEPA (1993) | 0.008 | Nagy (2001) (a) | -- | Negligible (b) | 13.9% | 0.00106 | USEPA (2007) (c) |
| American robin | *Turdus migratorius* | Terrestrial invertivore | 0.42 | Sample and Suter (1994) | 1 | 0.077 | | 100% | | | USEPA (1993) | 0.012 | Nagy (2001) (d) | -- | Negligible (b) | 10.4% | 0.00120 | Beyer et al. (1994) (e) |
| Red-tailed hawk | *Buteo jamaicensis* | Terrestrial carnivore | 233 | Sample and Suter (1994) | 1 | 1.13 | | | 100% | | USEPA (1993) | 0.090 | Nagy (2001) (f) | -- | Negligible (b) | 5.7% | 0.00512 | USEPA (2007) |
| Marsh wren | *Cistothorus palustris* | Aquatic invertivore | 0.006 | DeGraaf and Rudis (1992) | 1 | 0.01 | | 100% | | | USEPA (1993) | 0.003 | Nagy (2001) (d) | 0.003 | Calder and Braun (1983) (g) | 2.0% | 0.00005 | Beyer et al. (1994) (h) |
| Osprey | *Pandion haliaetus* | Aquatic piscivore | 154 | USEPA (1993) | 1 | 1.22 | | | | 100% | USEPA (1993) | 0.094 | Nagy (2001) (d) | 0.067 | Calder and Braun (1983) (g) | 0.0% | 0.00000 | Sample and Suter (1994) |
| **Mammalian Receptors** | | | | | | | | | | | | | | | | | | |
| Raccoon | *Procyon lotor* | Semi-aquatic invertivore | 108 | USEPA (1993) | 1 | 5.2 | | 100% | | | USEPA (1993) | 0.076 | Nagy (2001) (i) | 0.437 | Calder and Braun (1983) (g) | 9.4% | 0.00718 | Beyer et al. (1994) |
| American mink | *Neovison vison* | Semi-aquatic piscivore | 770 | Sample and Suter (1994) | 1 | 1 | | | | 100% | USEPA (1993); Sample and Suter (1994) | 0.049 | Nagy (2001) (j) | 0.099 | Calder and Braun (1983) (g) | 0.0% | 0.00000 | Sample and Suter (1994) |

**Notes:**

ha = hectare; invert. = invertebrates; kg = kilogram; % = percent; USEPA = United States Environmental Protection Agency

(a) Estimated food ingestion rate (kg/day dry weight) for granivorous birds = (0.088*[Body Weight in kg*1000]^0.891)/1000

(b) For terrestrial receptors, the contribution of surface water was considered negligible with prey items consisting of each receptors primary source of dietary water.

(c) Estimated based on a soil consumption rate of mourning dove of 13.9% (USEPA, 2007).

(d) Estimated food ingestion rate (kg/day dry weight) for insectivorous birds = (0.540*[Body Weight in kg*1000]^0.705)/1000

(e) Estimated based on a soil consumption rate of woodcock of 10.4% (Beyer et al., 1994).

(f) Estimated food ingestion rate (kg/day dry weight) for carnivorous birds = (0.849*[Body Weight in kg*1000]^0.663)/1000

(g) For aquatic and semi-aquatic receptors, ingestion rate of surface water from the site (if available) was modeled based on the following equations developed by Caulder and Braun (1983) and as presented in Sample and Suter (1994):
Water ingestion rate (L/day) for birds = 0.059*(Body Weight in kg)^0.67
Water ingestion rate (L/day) for mammals = 0.099*(Body Weight in kg)^0.90

(h) Estimated based on a soil consumption rate of blue-winged teal of <2.0% (Beyer et al., 1994).

(i) Estimated food ingestion rate (kg/day dry weight) for mammalian insectivores = (0.373*[Body Weight in kg*1000]^0.622)/1000

(j) Estimated food ingestion rate (kg/day dry weight) for mammalian carnivores = (0.153*[Body Weight in kg*1000]^0.834)/1000

**References:**


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**Table 2**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Northern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Mercury | N/A | 0.019 | Regression | 0.043 | Bechtel-Jacobs (1998) (a) | Regression | 0.28 | Sample et al. (1998a) (b) | 0.0543 | 0.00103 | Sample et al. (1998b) |
| Vanadium | N/A | 16.9 | 0.00485 | 0.082 | Bechtel-Jacobs (1998) | 0.042 | 0.71 | Sample et al. (1998a) | 0.0123 | 0.208 | Sample et al. (1998b) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.0558 | Regression | 0.00278 | USEPA (2007) (c) | Modeled | 11.9 | USEPA (2007) (d) | 1 | 11.9 | Travis and Arms (1988) (e) |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Mercury | -0.996 | 0.544 | Bechtel-Jacobs (1998) |

(b) Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Mercury | 0.0781 | 0.3369 | Sample et al. (1998a) |

(c) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
log(BAF) = -0.4057 x log $K_{ow}$ + 1.781; and log $K_{ow}$ = 3 – 8

(d) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{0.87} \times \log K_{ow} - 2.0])/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and log $K_{ow}$ = 2 – 8, $f_{oc}$ = 1%, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

(e) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$
When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

**References:**


Bechtel Jacobs Company LLC. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133

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**Table 3**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Western AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Lead | N/A | 17.3 | Regression | 1.31 | Bechtel-Jacobs (1998) (a) | Regression | 8.02 | Sample et al. (1998a) (b) | Regression | 2.38 | Sample et al. (1998b) (c) |
| Mercury | N/A | 0.077 | Regression | 0.0916 | Bechtel-Jacobs (1998) (a) | Regression | 0.456 | Sample et al. (1998a) (b) | 0.0543 | 0.00418 | Sample et al. (1998b) |
| Vanadium | N/A | 18.4 | 0.00485 | 0.0892 | Bechtel-Jacobs (1998) | 0.042 | 0.773 | Sample et al. (1998a) | 0.0123 | 0.226 | Sample et al. (1998b) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.085 | Regression | 0.00424 | USEPA (2007) (d) | Modeled | 18.2 | USEPA (2007) (e) | 1 | 18.2 | Travis and Arms (1988) (f) |

**Notes:**
BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Lead | -1.328 | 0.561 | Bechtel-Jacobs (1998) |
| Mercury | -0.996 | 0.544 | Bechtel-Jacobs (1998) |

(b) Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Lead | -0.218 | 0.807 | Sample et al. (1998a) |
| Mercury | 0.0781 | 0.3369 | Sample et al. (1998a) |

(c) Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]).
If multiple trophic-based models were presented, the best fitting model was applied. Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Lead | -0.6114 | 0.5181 | Sample et al. (1998b) |

(d) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(e) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc} = 1\%$, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

(f) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$
When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

**References:**

Bechtel Jacobs Company LLC. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133
Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter, II, and T.L. Ashwood. 1998a. Development and Validation of Bioaccumulation Models for Earthworms. Oak Ridge National Laboratory, Oak Ridge TN. 93 pp. ES/ER/TM-220.
Sample, B.E., J.J. Beauchamp, R.A. Efroymson, and G.W. Suter, II. 1998b. Development and Validation of Bioaccumulation Models for Small Mammals. Oak Ridge National Laboratory, Oak Ridge TN. 89 pp. ES/ER/TM-219.
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**Table 4**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Cadmium | N/A | 0.76 | Regression | 0.535 | Bechtel-Jacobs (1998) (a) | Regression | 2.80 | Neuhauser et al. (1995) (b) | Regression | 0.250 | Sample et al. (1998b) (c) |
| Chromium | N/A | 126 | 0.041 | 5.17 | Bechtel-Jacobs (1998) | 0.306 | 38.6 | Sample et al. (1998a) | Regression | 8.08 | Sample et al. (1998b) (c) |
| Lead | N/A | 121 | Regression | 3.91 | Bechtel-Jacobs (1998) (a) | Regression | 38.6 | Sample et al. (1998a) (b) | Regression | 6.51 | Sample et al. (1998b) (c) |
| Mercury | N/A | 0.23 | Regression | 0.166 | Bechtel-Jacobs (1998) (a) | Regression | 0.659 | Sample et al. (1998a) (b) | 0.0543 | 0.0125 | Sample et al. (1998b) |
| Nickel | N/A | 502 | Regression | 11.3 | Bechtel-Jacobs (1998) (a) | 1.059 | 532 | Sample et al. (1998a) | Regression | 14.2 | Sample et al. (1998b) (c) |
| Selenium | N/A | 1.5 | Regression | 0.794 | Bechtel-Jacobs (1998) (a) | Regression | 1.25 | Sample et al. (1998a) (b) | Regression | 0.769 | Sample et al. (1998b) (c) |
| Vanadium | N/A | 32.5 | 0.00485 | 0.158 | Bechtel-Jacobs (1998) | 0.042 | 1.37 | Sample et al. (1998a) | 0.0123 | 0.400 | Sample et al. (1998b) |
| Zinc | N/A | 146 | Regression | 76.8 | Bechtel-Jacobs (1998) (a) | Regression | 439 | Sample et al. (1998a) (b) | Regression | 135 | Sample et al. (1998b) (c) |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 6.9 | 0.423 | Modeled | 0.042 | USEPA (2007) | 11.2 | 4.7 | USEPA (2007) | 4.83 | 22.9 | USEPA (2007) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.0519 | Regression | 0.00259 | USEPA (2007) (d) | Modeled | 11.1 | USEPA (2007) (e) | 1 | 11.1 | Travis and Arms (1988) (f) |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | N/A | 19.58 | Regression | 3.05 | USEPA (2007) (a) | 2.6 | 50.9 | USEPA (2007) | 0 | 0 | USEPA (2007) (g) |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Cadmium | -0.476 | 0.546 | Bechtel-Jacobs (1998) |
| Lead | -1.328 | 0.561 | Bechtel-Jacobs (1998) |
| Mercury | -0.996 | 0.544 | Bechtel-Jacobs (1998) |
| Nickel | -2.224 | 0.748 | Bechtel-Jacobs (1998) |
| Selenium | -0.678 | 1.104 | Bechtel-Jacobs (1998) |
| Zinc | 1.575 | 0.555 | Bechtel-Jacobs (1998) |
| Total HMW PAHs | -1.7026 | 0.9469 | USEPA (2007) |

(b) Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Cadmium | 1.21 | 0.66 | Neuhauser et al. (1995) |
| Lead | -0.218 | 0.807 | Sample et al. (1998a) |
| Mercury | 0.0781 | 0.3369 | Sample et al. (1998a) |

**Table 4**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| Selenium | -0.075 | 0.733 | Sample et al. (1998a) | | | | | | | | |
| Zinc | 4.449 | 0.328 | Sample et al. (1998a) | | | | | | | | |

(c) Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]).
If multiple trophic-based models were presented, the best fitting model was applied. Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Cadmium | -1.2571 | 0.4723 | Sample et al. (1998b) |
| Chromium | -1.4599 | 0.7338 | Sample et al. (1998b) |
| Lead | -0.6114 | 0.5181 | Sample et al. (1998b) |
| Nickel | -0.2464 | 0.4658 | Sample et al. (1998b) |
| Selenium | -0.4158 | 0.3764 | Sample et al. (1998b) |
| Zinc | 4.2479 | 0.1324 | Sample et al. (1998b) |

(d) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(e) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc} = 1\%$, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

(f) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$
When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

(g) Bioaccumulation expected to be minimal due to rapid metabolism of these compounds after ingestion (USEPA, 2007).

**References:**


Bechtel Jacobs Company LLC. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133
Neuhauser, E. F., Z. V. Cukic, M. R. Malecki, R. C. Loehr, and P. R. Durkin. 1995."Bioconcentration and biokinetics of heavy metals in the earthworm." Environ. Poll. 89: 293-301.
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**Table 5**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Antimony | N/A | 63.7 | Regression | 1.93 | USEPA (2007) (a) | 1.00 | 63.7 | USEPA (2007) (b) | Modeling | 0.09669 | USEPA (2007) (c) |
| Cadmium | N/A | 21.6 | Regression | 3.33 | Bechtel-Jacobs (1998) (a) | Regression | 25.5 | Neuhauser et al. (1995) (d) | Regression | 1.214 | Sample et al. (1998b) (e) |
| Chromium | N/A | 616 | 0.041 | 25.3 | Bechtel-Jacobs (1998) | 0.306 | 188 | Sample et al. (1998a) | Regression | 25.88 | Sample et al. (1998b) (e) |
| Copper | N/A | 5100 | Regression | 56.4 | Bechtel-Jacobs (1998) (a) | Regression | 50.8 | Sample et al. (1998a) (d) | Regression | 37.6 | Sample et al. (1998b) (e) |
| Lead | N/A | 2120 | Regression | 19.5 | Bechtel-Jacobs (1998) (a) | Regression | 389 | Sample et al. (1998a) (d) | Regression | 28.7 | Sample et al. (1998b) (e) |
| Mercury | N/A | 1.8 | Regression | 0.509 | Bechtel-Jacobs (1998) (a) | Regression | 1.32 | Sample et al. (1998a) (d) | 0.0543 | 0.09774 | Sample et al. (1998b) |
| Nickel | N/A | 132 | Regression | 4.17 | Bechtel-Jacobs (1998) (a) | 1.059 | 140 | Sample et al. (1998a) | Regression | 7.60 | Sample et al. (1998b) (e) |
| Selenium | N/A | 4.4 | Regression | 2.61 | Bechtel-Jacobs (1998) (a) | Regression | 2.75 | Sample et al. (1998a) (d) | Regression | 1.15 | Sample et al. (1998b) (e) |
| Silver | N/A | 84.5 | 0.014 | 1.18 | Bechtel-Jacobs (1998) | 2.045 | 173 | Sample et al. (1998a) | 0.004 | 0.34 | Sample et al. (1998b) |
| Vanadium | N/A | 51 | 0.00485 | 0.247 | Bechtel-Jacobs (1998) | 0.042 | 2.14 | Sample et al. (1998a) | 0.0123 | 0.627 | Sample et al. (1998b) |
| Zinc | N/A | 4280 | Regression | 501 | Bechtel-Jacobs (1998) (a) | Regression | 1328 | Sample et al. (1998a) (d) | Regression | 212 | Sample et al. (1998b) (e) |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 6.9 | 2.061 | Modeled | 0.140 | USEPA (2007) | 11.2 | 23.1 | USEPA (2007) | 4.83 | 111.5 | USEPA (2007) |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 7.6 | 0.213 | -- | 0 | USEPA (1997) (i) | Regression | 0.500 | Sample et al. (1998a) (d) | 1 | 0.500 | Travis and Arms (1988) (h) |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 6.8 | 4.10E-05 | Regression | 0.00000432 | USEPA (2007) (f) | Modeled | 0.000848 | USEPA (2007) (g) | 0.158 | 0.000134 | Travis and Arms (1988) (h) |
| Total TEQ (Mammal) | 6.8 | 2.59E-05 | Regression | 0.00000273 | USEPA (2007) (f) | Modeled | 0.000536 | USEPA (2007) (g) | 0.158 | 0.0000849 | Travis and Arms (1988) (h) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.199 | Regression | 0.00992 | USEPA (2007) (f) | Modeled | 42.6 | USEPA (2007) (g) | 1 | 42.6 | Travis and Arms (1988) (h) |

**Table 5**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Antimony | -3.233 | 0.937 | USEPA (2007) |
| Cadmium | -0.476 | 0.546 | Bechtel-Jacobs (1998) |
| Copper | 0.669 | 0.394 | Bechtel-Jacobs (1998) |
| Lead | -1.328 | 0.561 | Bechtel-Jacobs (1998) |
| Mercury | -0.996 | 0.544 | Bechtel-Jacobs (1998) |
| Nickel | -2.224 | 0.748 | Bechtel-Jacobs (1998) |
| Selenium | -0.678 | 1.104 | Bechtel-Jacobs (1998) |
| Zinc | 1.575 | 0.555 | Bechtel-Jacobs (1998) |

(b) Not available; bioaccumulation factor is assumed to be 1.0 USEPA (2007)

(c) USEPA (2007) suggests using a diet-to-beef model presented in Baes et al. (1984) for inorganics without established uptake models, where:
$BAF_{soil\text{-}to\text{-}beef} = BAF_{soil\text{-}to\text{-}diet\ (plant)} \times 50$ (cattle food intake) x $F_f$ (diet-to-biota factor)

Diet-to-biota factors presented in Baes et al. (1984) are listed below:

| Chemical | $F_f$ |
|---|---|
| Antimony | 0.001 |

(d) Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Aroclor 1260 | 1.41 | 1.36 | Sample et al. (1998a) |
| Cadmium | 1.21 | 0.66 | Neuhauser et al. (1995) |
| Copper | 1.675 | 0.264 | Sample et al. (1998a) |
| Lead | -0.218 | 0.807 | Sample et al. (1998a) |
| Mercury | 0.0781 | 0.3369 | Sample et al. (1998a) |
| Selenium | -0.075 | 0.733 | Sample et al. (1998a) |
| Zinc | 4.449 | 0.328 | Sample et al. (1998a) |

(e) Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]).
If multiple trophic-based models were presented, the best fitting model was applied. Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Cadmium | -1.2571 | 0.4723 | Sample et al. (1998b) |
| Chromium | -1.4599 | 0.7338 | Sample et al. (1998b) |
| Copper | 2.1042 | 0.1783 | Sample et al. (1998b) |
| Lead | -0.6114 | 0.5181 | Sample et al. (1998b) |
| Nickel | -0.2464 | 0.4658 | Sample et al. (1998b) |
| Selenium | -0.4158 | 0.3764 | Sample et al. (1998b) |
| Zinc | 4.2479 | 0.1324 | Sample et al. (1998b) |

(f) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(g) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc}$ = 1%, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

**Table 5**
**Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |

(h) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:

$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$

When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

(i) PCBs not likely to be taken up by plants; bioaccumulation expected to be negligible (USEPA 1997).

**References:**


Bechtel Jacobs Company LLC. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133

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**Table 6**
**Biota Sediment Accumulation Factors and Estimated Concentrations in Prey Items (Upgradient Drainage)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Sediment EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Aquatic Life Stage Benthic Invertebrates | | | Fish | | |
| | | | $BSAF_{invertebrates}$ | Estimated Concentration | Reference | $BSAF_{fish}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | |
| Arsenic | N/A | 13.3 | 0.127 | 1.69 | Bechtel and Jacobs (1998) (a) | 0.127 | 1.69 | Assumption (b) |
| Cadmium | N/A | 1.5 | 3.073 | 4.61 | Bechtel and Jacobs (1998) (c) | 0.037 | 0.06 | Song and Breslin (1999) (d) |
| Copper | N/A | 56.5 | 95% UPL | 120 | Bechtel and Jacobs (1998) (e) | 0.17 | 9.61 | Song and Breslin (1999) (d) |
| Lead | N/A | 96.9 | 0.066 | 6.4 | Bechtel and Jacobs (1998) (a) | 0.066 | 6.40 | Assumption (b) |
| Mercury | N/A | 0.49 | 1.735 | 0.85 | Bechtel and Jacobs (1998) (f) | 0.1 x [benthic invertebrate] | 0.09 | Unrine et al. (2005) |
| Nickel | N/A | 18.5 | 95% UPL | 7.2 | Bechtel and Jacobs (1998) (e) | 0.16 | 2.96 | Song and Breslin (1999) (d) |
| Silver | N/A | 1.5 | 1 | 1.50 | Assumption (g) | 1 | 1.50 | Assumption (b) |
| Vanadium | N/A | 31.6 | Regression | 2.62 | Hamilton and Buhl (2003a,b) (h) | Regression | 2.62 | Assumption (b) |
| Zinc | N/A | 324 | 95% UPL | 348 | Bechtel and Jacobs (1998) (e) | 0.216 | 69.98 | Song and Breslin (1999) (d) |
| **Pesticides** | | | | | | | | |
| Total DDD/DDE/DDT | 6.9 | 0.2139 | 2.84 | 0.61 | DiToro and Mcgrath (2000) (i) | 13.67 | 2.92 | DiToro and Mcgrath (2000) (i) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.161 | 2.67 | 0.43 | DiToro and Mcgrath (2000) (i) | 12.86 | 2.07 | DiToro and Mcgrath (2000) (i) |

**Notes:**

BSAF = Biota Sediment Accumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram;
USEPA = United States Environmental Protection Agency

(a) Median BSAF for non-depurated invertebrates determined by Bechtel and Jacobs (1998)

(b) Sediment-to-fish BSAFs could not be identified; therefore, concentrations in fish were assumed to be equal to concentrations in benthic invertebrates.

(c) 90th percentile BSAF for depurated invertebrates determined by Bechtel and Jacobs (1998)

(d) Mean BSAF calculated from Song and Breslin (1999)

(e) 95% upper prediction limit (UPL) of regressions calculated by Bechtel and Jacobs(1998); calculated according to Appendix A in Bechtel and Jacobs (1998)

(f) 90th percentile BSAF for non-depurated invertebrates determined by Bechtel and Jacobs (1998)

(g) Sediment-to-invertebrate BSAFs could not be identified; therefore, concentrations in benthic invertebrates were assumed to be equal to the sediment EPC.

(h) Invertebrate concentrations (mg/kg dry weight) calculated based on regression models, where slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Model | Data Source for Model | |
|---|---|---|---|---|---|
| Vanadium | -1.5311 | 0.7219 | y = B0 + B1 * ln([sediment]) | Hamilton and Buhl (2003a,b) | |

**Table 6**
**Biota Sediment Accumulation Factors and Estimated Concentrations in Prey Items (Upgradient Drainage)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Sediment EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Aquatic Life Stage Benthic Invertebrates | | | Fish | | |
| | | | $BSAF_{invertebrates}$ | Estimated Concentration | Reference | $BSAF_{fish}$ | Estimated Concentration | Reference |


**References:**

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**Table 7**
**Biota Sediment Accumulation Factors and Estimated Concentrations in Prey Items (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Sediment EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Aquatic Life Stage Benthic Invertebrates | | | Fish | | |
| | | | $BSAF_{invertebrates}$ | Estimated Concentration | Reference | $BSAF_{fish}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | |
| Aluminum | N/A | 28000 | 1 | 28000 | Assumption (a) | 1 | 28000 | Assumption (b) |
| Arsenic | N/A | 21.3 | 0.127 | 2.71 | Bechtel and Jacobs (1998) (c) | 0.127 | 2.71 | Assumption (b) |
| Chromium | N/A | 59 | 0.588 | 34.7 | Bechtel and Jacobs (1998) (c) | 0.588 | 34.7 | Assumption (b) |
| Copper | N/A | 21.9 | 95% UPL | 92 | Bechtel and Jacobs (1998) (d) | 0.17 | 3.72 | Song and Breslin (1999) (e) |
| Lead | N/A | 45.3 | 0.066 | 2.99 | Bechtel and Jacobs (1998) (c) | 0.066 | 2.99 | Assumption (b) |
| Nickel | N/A | 26 | 95% UPL | 9.09 | Bechtel and Jacobs (1998) (d) | 0.16 | 4.16 | Song and Breslin (1999) (e) |
| Selenium | N/A | 3.4 | Regression | 4.83 | Hamilton and Buhl (2003a,b) (g) | Regression | 4.83 | Assumption (b) |
| Vanadium | N/A | 77 | Regression | 4.98 | Hamilton and Buhl (2003a,b) (g) | Regression | 4.98 | Assumption (b) |
| **Dioxins and Furans** | | | | | | | | |
| Total TEQ (Bird) | 6.8 | 0.00000388 | 2.87 | 0.0000111 | DiToro and Mcgrath (2000) (h) | 13.79 | 0.0000536 | DiToro and Mcgrath (2000) (h) |
| Total TEQ (Mammal) | 6.8 | 0.00000488 | 2.87 | 0.0000140 | DiToro and Mcgrath (2000) (h) | 13.79 | 0.0000672 | DiToro and Mcgrath (2000) (h) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 162 | 2.67 | 433 | DiToro and Mcgrath (2000) (h) | 12.86 | 2083 | DiToro and Mcgrath (2000) (h) |
| Di-n-octyl phthalate | 8.1 | 3.08 | 2.56 | 7.88 | DiToro and Mcgrath (2000) (h) | 12.31 | 37.9 | DiToro and Mcgrath (2000) (h) |

**Notes:**
BSAF = Biota Sediment Accumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram;
USEPA = United States Environmental Protection Agency

(a) Sediment-to-invertebrate BSAFs could not be identified; therefore, concentrations in benthic invertebrates were assumed to be equal to the sediment EPC.

(b) Sediment-to-fish BSAFs could not be identified; therefore, concentrations in fish were assumed to be equal to concentrations in benthic invertebrates.

(c) Median BSAF for non-depurated invertebrates determined by Bechtel and Jacobs (1998)

(d) 95% upper prediction limit (UPL) of regressions calculated by Bechtel and Jacobs(1998); calculated according to Appendix A in Bechtel and Jacobs (1998)

(e) Mean BSAF calculated from Song and Breslin (1999)

(g) Invertebrate concentrations (mg/kg dry weight) calculated based on regression models, where slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Model | Data Source for Model | |
|---|---|---|---|---|---|
| Selenium | -- | 1.422 | y = B1 * [sediment] | Hamilton and Buhl (2003a,b) | |
| Vanadium | -1.5311 | 0.7219 | y = B0 + B1 * ln([sediment]) | Hamilton and Buhl (2003a,b) | |

**Table 7**
**Biota Sediment Accumulation Factors and Estimated Concentrations in Prey Items (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Maximum Sediment EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Aquatic Life Stage Benthic Invertebrates | | | Fish | | |
| | | | $BSAF_{invertebrates}$ | Estimated Concentration | Reference | $BSAF_{fish}$ | Estimated Concentration | Reference |

**References:**


Bechtel Jacobs Company LLC. 1998. Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-112

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Song, Ki-Hoon and Vincent T. Breslin. 1999. Accumulation and Transport of Sediment Metals by the Vertically Migrating Opossum Shrimp, Mysis relicta. International Association of Great Lakes Res. 25(3):429-442.

**Table 8**
**Toxicity Reference Values**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Avian Receptors | | | | Mammalian Receptors | | | |
|---|---|---|---|---|---|---|---|---|
| | Chronic NOAEL (mg/kg-bw/d) | Source | Chronic LOAEL (mg/kg-bw/d) | Source | Chronic NOAEL (mg/kg-bw/d) | Source | Chronic LOAEL (mg/kg-bw/d) | Source |
| **Metals** | | | | | | | | |
| Aluminum | 109.7 | Sample et al. (1996) | 1097 | NOAEL x 10 Uncertainty Factor (NOAEL to LOAEL) | 1.93 | Sample et al. (1996) | 19.3 | Sample et al. (1996) |
| Antimony | N/A | USEPA Eco-SSL; Insufficient data to derive a TRV | N/A | USEPA Eco-SSL; Insufficient data to derive a TRV | 0.059 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 2.76 | USEPA Eco-SSL; Geometric Mean (LOAEL) |
| Arsenic | 2.24 | USEPA Eco-SSL; Geometric Mean (NOAEL) | 4.51 | USEPA Eco-SSL Geometric Mean (LOAEL) | 1.04 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 4.55 | USEPA Eco-SSL; Geometric Mean (LOAEL) |
| Cadmium | 1.47 | USEPA Eco-SSL; Geometric Mean (NOAEL) | 6.35 | USEPA Eco-SSL Geometric Mean (LOAEL) | 0.77 | USEPA Eco-SSL Highest bounded NOAEL lower than the lowest bounded LOAEL | 6.9 | USEPA Eco-SSL Geometric Mean (LOAEL) |
| Chromium | 2.66 | USEPA Eco-SSL Geometric Mean (NOAEL) | 15.6 | USEPA Eco-SSL Geometric Mean (LOAEL) | 2.40 | USEPA Eco-SSL Geometric Mean (NOAEL) | 58.2 | USEPA Eco-SSL Geometric Mean (LOAEL) |
| Copper | 4.05 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 34.9 | USEPA Eco-SSL; Geometric Mean (LOAEL) | 5.60 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 82.7 | USEPA Eco-SSL; Geometric Mean (LOAEL) |
| Lead | 1.63 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 44.6 | USEPA Eco-SSL; Geometric Mean (LOAEL) | 4.7 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 186.4 | USEPA Eco-SSL; Geometric Mean (LOAEL) |
| Mercury | 0.45 | Sample et al. (1996) | 0.9 | Sample et al. (1996) | 1 | Sample et al. (1996) | 10 | NOAEL x 10 Uncertainty Factor (NOAEL to LOAEL) |
| Nickel | 6.71 | USEPA Eco-SSL Geometric Mean (NOAEL) | 18.6 | USEPA Eco-SSL Geometric Mean (LOAEL) | 1.7 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 7.7 | USEPA Eco-SSL; Geometric Mean (NOAEL) |
| Selenium | 0.29 | Eco-SSL Highest bounded NOAEL lower than the lowest bounded LOAEL | 0.61 | USEPA Eco-SSL; Geometric Mean (NOAEL) | 0.14 | Eco-SSL Highest bounded NOAEL lower than the lowest bounded LOAEL | 0.44 | USEPA Eco-SSL; Geometric Mean (NOAEL) |
| Silver | 2.02 | USEPA Eco-SSL Lowest LOAEL divided by 10 | 60.47 | USEPA Eco-SSL Geometric Mean (LOAEL) | 6.02 | USEPA Eco-SSL Lowest LOAEL divided by 10 | 118.62 | USEPA Eco-SSL Geometric Mean (LOAEL) |
| Vanadium | 0.344 | Eco-SSL Highest bounded NOAEL lower than the lowest bounded LOAEL | 1.19 | USEPA Eco-SSL Geometric Mean (NOAEL) | 4.16 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 5.92 | USEPA Eco-SSL; Geometric Mean (NOAEL) |
| Zinc | 66.1 | USEPA Eco-SSL; Geometric Mean (NOAEL) | 171.4 | USEPA Eco-SSL Geometric Mean (LOAEL) | 75.4 | USEPA Eco-SSL; Geometric Mean (NOAEL) | 297.6 | USEPA Eco-SSL Geometric Mean (LOAEL) |
| **Pesticides** | | | | | | | | |
| Total DDD/DDE/DDT | 0.227 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 4.66 | USEPA Eco-SSL Geometric Mean (NOAEL) | 0.147 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 7.65 | USEPA Eco-SSL Geometric Mean (NOAEL) |

**Table 8**
**Toxicity Reference Values**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Avian Receptors | | | | Mammalian Receptors | | | |
|---|---|---|---|---|---|---|---|---|
| | Chronic NOAEL (mg/kg-bw/d) | Source | Chronic LOAEL (mg/kg-bw/d) | Source | Chronic NOAEL (mg/kg-bw/d) | Source | Chronic LOAEL (mg/kg-bw/d) | Source |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | |
| Aroclor 1260 | 0.18 | Sample et al. (1996) | 1.8 | Sample et al. (1996) | 2 | Mayes et al. (1998) | 4.1 | Mayes et al. (1998) |
| **Dioxins and Furans** | | | | | | | | |
| Total TEQ (Bird) | 0.000014 | Sample et al. (1996) | 0.00014 | Sample et al. (1996) | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | N/A | -- | N/A | -- | 0.000001 | Sample et al. (1996) | 0.00001 | Sample et al. (1996) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 1.1 | LANL (2017) | 11 | LANL (2017); NOAEL x 10 Uncertainty Factor (NOAEL to LOAEL) | 18.3 | LANL (2017) | 183 | LANL (2017); NOAEL x 10 Uncertainty Factor (NOAEL to LOAEL) |
| Di-n-octyl phthalate | N/A | -- | N/A | -- | 65.1 | LANL (2017) | 651 | LANL (2017); NOAEL x 10 Uncertainty Factor (NOAEL to LOAEL) |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | |
| Total HMW PAHs | 2 | Trust et al. (1994) | 20 | Trust et al. (1994) | 0.615 | USEPA Eco-SSL; Highest bounded NOAEL lower than the lowest bounded LOAEL | 18 | USEPA Eco-SSL; Geometric Mean (NOAEL) |

**Notes:**

-- Appropriate data are not available from published literature to derive NOAEL and LOAEL values.

bw/d = body weight per day; kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Applicable; NOAEL = No Observable Adverse Effect Level; TRV = toxicity reference value

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USEPA Eco-SSLs available at https://www.epa.gov/risk/ecological-soil-screening-level-eco-ssl-guidance-and-documents

**Table 9**
**Terrestrial Dose Rate Model Output (Northern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Mercury | 0.019 | 2.18E-03 | 0.00E+00 | 0.00E+00 | 2.18E-03 | 1.35E-04 | 2.31E-03 | 0.45 | <1 | 0.9 | <1 |
| Vanadium | 16.9 | 4.18E-03 | 0.00E+00 | 0.00E+00 | 4.18E-03 | 1.20E-01 | 1.24E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 1.42E-04 | 0.00E+00 | 0.00E+00 | 1.42E-04 | 3.95E-04 | 5.37E-04 | 1.1 | <1 | 11 | <1 |

| Analyte | EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Mercury | 0.019 | 0.00E+00 | 4.26E-02 | 0.00E+00 | 4.26E-02 | 2.96E-04 | 4.29E-02 | 0.45 | <1 | 0.9 | <1 |
| Vanadium | 16.9 | 0.00E+00 | 1.06E-01 | 0.00E+00 | 1.06E-01 | 2.64E-01 | 3.70E-01 | 0.344 | **1** | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 0.00E+00 | 1.79E+00 | 0.00E+00 | 1.79E+00 | 8.70E-04 | 1.79E+00 | 1.1 | **2** | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Mercury | 0.019 | 0.00E+00 | 0.00E+00 | 8.20E-05 | 8.20E-05 | 8.60E-05 | 1.68E-04 | 0.45 | <1 | 0.9 | <1 |
| Vanadium | 16.9 | 0.00E+00 | 0.00E+00 | 1.65E-02 | 1.65E-02 | 7.65E-02 | 9.30E-02 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 0.00E+00 | 0.00E+00 | 9.48E-01 | 9.48E-01 | 2.53E-04 | 9.48E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Mercury | 0.019 | 9.59E-03 | 0.00E+00 | 0.00E+00 | 9.59E-03 | 1.36E-04 | 9.72E-03 | 1 | <1 | 10 | <1 |
| Vanadium | 16.9 | 1.84E-02 | 0.00E+00 | 0.00E+00 | 1.84E-02 | 1.21E-01 | 1.40E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 6.24E-04 | 0.00E+00 | 0.00E+00 | 6.24E-04 | 4.00E-04 | 1.02E-03 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Mercury | 0.019 | 0.00E+00 | 3.81E-02 | 0.00E+00 | 3.81E-02 | 7.64E-05 | 3.82E-02 | 1 | <1 | 10 | <1 |
| Vanadium | 16.9 | 0.00E+00 | 9.51E-02 | 0.00E+00 | 9.51E-02 | 6.79E-02 | 1.63E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 0.00E+00 | 1.60E+00 | 0.00E+00 | 1.60E+00 | 2.24E-04 | 1.60E+00 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Mercury | 0.019 | 0.00E+00 | 0.00E+00 | 3.91E-05 | 3.91E-05 | 2.01E-05 | 5.92E-05 | 1 | <1 | 10 | <1 |
| Vanadium | 16.9 | 0.00E+00 | 0.00E+00 | 7.87E-03 | 7.87E-03 | 1.79E-02 | 2.58E-02 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 0.00E+00 | 0.00E+00 | 4.52E-01 | 4.52E-01 | 5.92E-05 | 4.52E-01 | 18.3 | <1 | 183 | <1 |

**Table 9**
**Terrestrial Dose Rate Model Output (Northern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 10**
**Terrestrial Dose Rate Model Output (Western AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Lead | 17.3 | 6.68E-02 | 0.00E+00 | 0.00E+00 | 6.68E-02 | 1.23E-01 | 1.89E-01 | 1.63 | <1 | 44.6 | <1 |
| Mercury | 0.077 | 4.67E-03 | 0.00E+00 | 0.00E+00 | 4.67E-03 | 5.45E-04 | 5.21E-03 | 0.45 | <1 | 0.9 | <1 |
| Vanadium | 18.4 | 4.55E-03 | 0.00E+00 | 0.00E+00 | 4.55E-03 | 1.30E-01 | 1.35E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 2.16E-04 | 0.00E+00 | 0.00E+00 | 2.16E-04 | 6.02E-04 | 8.18E-04 | 1.1 | <1 | 11 | <1 |

| Analyte | EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Lead | 17.3 | 0.00E+00 | 1.20E+00 | 0.00E+00 | 1.20E+00 | 2.70E-01 | 1.47E+00 | 1.63 | <1 | 44.6 | <1 |
| Mercury | 0.077 | 0.00E+00 | 6.83E-02 | 0.00E+00 | 6.83E-02 | 1.20E-03 | 6.95E-02 | 0.45 | <1 | 0.9 | <1 |
| Vanadium | 18.4 | 0.00E+00 | 1.16E-01 | 0.00E+00 | 1.16E-01 | 2.87E-01 | 4.03E-01 | 0.344 | **1** | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 0.00E+00 | 2.73E+00 | 0.00E+00 | 2.73E+00 | 1.33E-03 | 2.73E+00 | 1.1 | **2** | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Lead | 17.3 | 0.00E+00 | 0.00E+00 | 1.89E-01 | 1.89E-01 | 7.83E-02 | 2.67E-01 | 1.63 | <1 | 44.6 | <1 |
| Mercury | 0.077 | 0.00E+00 | 0.00E+00 | 3.32E-04 | 3.32E-04 | 3.49E-04 | 6.81E-04 | 0.45 | <1 | 0.9 | <1 |
| Vanadium | 18.4 | 0.00E+00 | 0.00E+00 | 1.80E-02 | 1.80E-02 | 8.33E-02 | 1.01E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 0.00E+00 | 0.00E+00 | 1.44E+00 | 1.44E+00 | 3.85E-04 | 1.44E+00 | 1.1 | **1** | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Lead | 17.3 | 2.94E-01 | 0.00E+00 | 0.00E+00 | 2.94E-01 | 1.24E-01 | 4.18E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.077 | 2.05E-02 | 0.00E+00 | 0.00E+00 | 2.05E-02 | 5.52E-04 | 2.11E-02 | 1 | <1 | 10 | <1 |
| Vanadium | 18.4 | 2.00E-02 | 0.00E+00 | 0.00E+00 | 2.00E-02 | 1.32E-01 | 1.52E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 9.50E-04 | 0.00E+00 | 0.00E+00 | 9.50E-04 | 6.10E-04 | 1.56E-03 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Lead | 17.3 | 0.00E+00 | 1.08E+00 | 0.00E+00 | 1.08E+00 | 6.96E-02 | 1.14E+00 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.077 | 0.00E+00 | 6.11E-02 | 0.00E+00 | 6.11E-02 | 3.10E-04 | 6.14E-02 | 1 | <1 | 10 | <1 |
| Vanadium | 18.4 | 0.00E+00 | 1.04E-01 | 0.00E+00 | 1.04E-01 | 7.40E-02 | 1.78E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 0.00E+00 | 2.44E+00 | 0.00E+00 | 2.44E+00 | 3.42E-04 | 2.44E+00 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Lead | 17.3 | 0.00E+00 | 0.00E+00 | 9.00E-02 | 9.00E-02 | 1.83E-02 | 1.08E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.077 | 0.00E+00 | 0.00E+00 | 1.58E-04 | 1.58E-04 | 8.16E-05 | 2.40E-04 | 1 | <1 | 10 | <1 |
| Vanadium | 18.4 | 0.00E+00 | 0.00E+00 | 8.57E-03 | 8.57E-03 | 1.95E-02 | 2.81E-02 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 0.00E+00 | 0.00E+00 | 6.88E-01 | 6.88E-01 | 9.01E-05 | 6.88E-01 | 18.3 | <1 | 183 | <1 |

**Table 10**
**Terrestrial Dose Rate Model Output (Western AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 11**
**Terrestrial Dose Rate Model Output (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Cadmium | 0.76 | 2.73E-02 | 0.00E+00 | 0.00E+00 | 2.73E-02 | 5.38E-03 | 3.26E-02 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 126 | 2.63E-01 | 0.00E+00 | 0.00E+00 | 2.63E-01 | 8.93E-01 | 1.16E+00 | 2.66 | <1 | 15.6 | <1 |
| Lead | 121 | 1.99E-01 | 0.00E+00 | 0.00E+00 | 1.99E-01 | 8.57E-01 | 1.06E+00 | 1.63 | <1 | 44.6 | <1 |
| Mercury | 0.23 | 8.46E-03 | 0.00E+00 | 0.00E+00 | 8.46E-03 | 1.63E-03 | 1.01E-02 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 502 | 5.77E-01 | 0.00E+00 | 0.00E+00 | 5.77E-01 | 3.56E+00 | 4.13E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 1.5 | 4.05E-02 | 0.00E+00 | 0.00E+00 | 4.05E-02 | 1.06E-02 | 5.11E-02 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 32.5 | 8.03E-03 | 0.00E+00 | 0.00E+00 | 8.03E-03 | 2.30E-01 | 2.38E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 146 | 3.91E+00 | 0.00E+00 | 0.00E+00 | 3.91E+00 | 1.03E+00 | 4.95E+00 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 2.16E-03 | 0.00E+00 | 0.00E+00 | 2.16E-03 | 3.00E-03 | 5.16E-03 | 0.227 | <1 | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 1.32E-04 | 0.00E+00 | 0.00E+00 | 1.32E-04 | 3.68E-04 | 5.00E-04 | 1.1 | <1 | 11 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 1.55E-01 | 0.00E+00 | 0.00E+00 | 1.55E-01 | 1.39E-01 | 2.94E-01 | 2 | <1 | 20 | <1 |

| Analyte | EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Cadmium | 0.76 | 0.00E+00 | 4.19E-01 | 0.00E+00 | 4.19E-01 | 1.19E-02 | 4.31E-01 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 126 | 0.00E+00 | 5.78E+00 | 0.00E+00 | 5.78E+00 | 1.96E+00 | 7.75E+00 | 2.66 | **3** | 15.6 | <1 |
| Lead | 121 | 0.00E+00 | 5.78E+00 | 0.00E+00 | 5.78E+00 | 1.89E+00 | 7.67E+00 | 1.63 | **5** | 44.6 | <1 |
| Mercury | 0.23 | 0.00E+00 | 9.88E-02 | 0.00E+00 | 9.88E-02 | 3.59E-03 | 1.02E-01 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 502 | 0.00E+00 | 7.97E+01 | 0.00E+00 | 7.97E+01 | 7.83E+00 | 8.75E+01 | 6.71 | **13** | 18.6 | **5** |
| Selenium | 1.5 | 0.00E+00 | 1.87E-01 | 0.00E+00 | 1.87E-01 | 2.34E-02 | 2.11E-01 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 32.5 | 0.00E+00 | 2.05E-01 | 0.00E+00 | 2.05E-01 | 5.07E-01 | 7.11E-01 | 0.344 | **2** | 1.19 | <1 |
| Zinc | 146 | 0.00E+00 | 6.58E+01 | 0.00E+00 | 6.58E+01 | 2.28E+00 | 6.80E+01 | 66.1 | **1** | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 0.00E+00 | 7.10E-01 | 0.00E+00 | 7.10E-01 | 6.60E-03 | 7.17E-01 | 0.227 | **3** | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 0.00E+00 | 1.66E+00 | 0.00E+00 | 1.66E+00 | 8.09E-04 | 1.66E+00 | 1.1 | **2** | 11 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 0.00E+00 | 7.63E+00 | 0.00E+00 | 7.63E+00 | 3.05E-01 | 7.94E+00 | 2 | **4** | 20 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Cadmium | 0.76 | 0.00E+00 | 0.00E+00 | 1.99E-02 | 1.99E-02 | 3.44E-03 | 2.33E-02 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 126 | 0.00E+00 | 0.00E+00 | 6.42E-01 | 6.42E-01 | 5.71E-01 | 1.21E+00 | 2.66 | <1 | 15.6 | <1 |
| Lead | 121 | 0.00E+00 | 0.00E+00 | 5.17E-01 | 5.17E-01 | 5.48E-01 | 1.06E+00 | 1.63 | <1 | 44.6 | <1 |
| Mercury | 0.23 | 0.00E+00 | 0.00E+00 | 9.92E-04 | 9.92E-04 | 1.04E-03 | 2.03E-03 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 502 | 0.00E+00 | 0.00E+00 | 1.12E+00 | 1.12E+00 | 2.27E+00 | 3.40E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 1.5 | 0.00E+00 | 0.00E+00 | 6.11E-02 | 6.11E-02 | 6.79E-03 | 6.78E-02 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 32.5 | 0.00E+00 | 0.00E+00 | 3.18E-02 | 3.18E-02 | 1.47E-01 | 1.79E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 146 | 0.00E+00 | 0.00E+00 | 1.08E+01 | 1.08E+01 | 6.61E-01 | 1.14E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 0.00E+00 | 0.00E+00 | 1.82E+00 | 1.82E+00 | 1.92E-03 | 1.82E+00 | 0.227 | **8** | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 0.00E+00 | 0.00E+00 | 8.82E-01 | 8.82E-01 | 2.35E-04 | 8.82E-01 | 1.1 | <1 | 11 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.87E-02 | 8.87E-02 | 2 | <1 | 20 | <1 |

**Table 11**
**Terrestrial Dose Rate Model Output (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Cadmium | 0.76 | 1.20E-01 | 0.00E+00 | 0.00E+00 | 1.20E-01 | 5.45E-03 | 1.25E-01 | 0.77 | <1 | 6.9 | <1 |
| Chromium | 126 | 1.16E+00 | 0.00E+00 | 0.00E+00 | 1.16E+00 | 9.04E-01 | 2.06E+00 | 2.4 | <1 | 58.2 | <1 |
| Lead | 121 | 8.76E-01 | 0.00E+00 | 0.00E+00 | 8.76E-01 | 8.68E-01 | 1.74E+00 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.23 | 3.72E-02 | 0.00E+00 | 0.00E+00 | 3.72E-02 | 1.65E-03 | 3.89E-02 | 1 | <1 | 10 | <1 |
| Nickel | 502 | 2.54E+00 | 0.00E+00 | 0.00E+00 | 2.54E+00 | 3.60E+00 | 6.14E+00 | 1.7 | **4** | 7.7 | <1 |
| Selenium | 1.5 | 1.78E-01 | 0.00E+00 | 0.00E+00 | 1.78E-01 | 1.08E-02 | 1.89E-01 | 0.14 | **1** | 0.44 | <1 |
| Vanadium | 32.5 | 3.53E-02 | 0.00E+00 | 0.00E+00 | 3.53E-02 | 2.33E-01 | 2.68E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 146 | 1.72E+01 | 0.00E+00 | 0.00E+00 | 1.72E+01 | 1.05E+00 | 1.83E+01 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 9.52E-03 | 0.00E+00 | 0.00E+00 | 9.52E-03 | 3.03E-03 | 1.26E-02 | 0.147 | <1 | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 5.80E-04 | 0.00E+00 | 0.00E+00 | 5.80E-04 | 3.72E-04 | 9.52E-04 | 18.3 | <1 | 183 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 6.83E-01 | 0.00E+00 | 0.00E+00 | 6.83E-01 | 1.40E-01 | 8.23E-01 | 0.615 | **1** | 18 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Cadmium | 0.76 | 0.00E+00 | 3.75E-01 | 0.00E+00 | 3.75E-01 | 3.06E-03 | 3.78E-01 | 0.77 | <1 | 6.9 | <1 |
| Chromium | 126 | 0.00E+00 | 5.17E+00 | 0.00E+00 | 5.17E+00 | 5.07E-01 | 5.67E+00 | 2.4 | **2** | 58.2 | <1 |
| Lead | 121 | 0.00E+00 | 5.17E+00 | 0.00E+00 | 5.17E+00 | 4.86E-01 | 5.65E+00 | 4.7 | **1** | 186.4 | <1 |
| Mercury | 0.23 | 0.00E+00 | 8.83E-02 | 0.00E+00 | 8.83E-02 | 9.25E-04 | 8.92E-02 | 1 | <1 | 10 | <1 |
| Nickel | 502 | 0.00E+00 | 7.12E+01 | 0.00E+00 | 7.12E+01 | 2.02E+00 | 7.33E+01 | 1.7 | **43** | 7.7 | **10** |
| Selenium | 1.5 | 0.00E+00 | 1.67E-01 | 0.00E+00 | 1.67E-01 | 6.03E-03 | 1.73E-01 | 0.14 | **1** | 0.44 | <1 |
| Vanadium | 32.5 | 0.00E+00 | 1.83E-01 | 0.00E+00 | 1.83E-01 | 1.31E-01 | 3.14E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 146 | 0.00E+00 | 5.88E+01 | 0.00E+00 | 5.88E+01 | 5.87E-01 | 5.94E+01 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 0.00E+00 | 6.35E-01 | 0.00E+00 | 6.35E-01 | 1.70E-03 | 6.37E-01 | 0.147 | **4** | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 0.00E+00 | 1.49E+00 | 0.00E+00 | 1.49E+00 | 2.09E-04 | 1.49E+00 | 18.3 | <1 | 183 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 0.00E+00 | 6.82E+00 | 0.00E+00 | 6.82E+00 | 7.87E-02 | 6.90E+00 | 0.615 | **11** | 18 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Cadmium | 0.76 | 0.00E+00 | 0.00E+00 | 9.46E-03 | 9.46E-03 | 8.06E-04 | 1.03E-02 | 0.77 | <1 | 6.9 | <1 |
| Chromium | 126 | 0.00E+00 | 0.00E+00 | 3.06E-01 | 3.06E-01 | 1.34E-01 | 4.39E-01 | 2.4 | <1 | 58.2 | <1 |
| Lead | 121 | 0.00E+00 | 0.00E+00 | 2.47E-01 | 2.47E-01 | 1.28E-01 | 3.75E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.23 | 0.00E+00 | 0.00E+00 | 4.73E-04 | 4.73E-04 | 2.44E-04 | 7.17E-04 | 1 | <1 | 10 | <1 |
| Nickel | 502 | 0.00E+00 | 0.00E+00 | 5.36E-01 | 5.36E-01 | 5.32E-01 | 1.07E+00 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 1.5 | 0.00E+00 | 0.00E+00 | 2.91E-02 | 2.91E-02 | 1.59E-03 | 3.07E-02 | 0.14 | <1 | 0.44 | <1 |
| Vanadium | 32.5 | 0.00E+00 | 0.00E+00 | 1.51E-02 | 1.51E-02 | 3.45E-02 | 4.96E-02 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 146 | 0.00E+00 | 0.00E+00 | 5.12E+00 | 5.12E+00 | 1.55E-01 | 5.28E+00 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 0.00E+00 | 0.00E+00 | 8.66E-01 | 8.66E-01 | 4.48E-04 | 8.67E-01 | 0.147 | **6** | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 0.00E+00 | 0.00E+00 | 4.20E-01 | 4.20E-01 | 5.50E-05 | 4.20E-01 | 18.3 | <1 | 183 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.08E-02 | 2.08E-02 | 0.615 | <1 | 18 | <1 |

**Table 11**
**Terrestrial Dose Rate Model Output (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 12**
**Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 63.7 | 9.86E-02 | 0.00E+00 | 0.00E+00 | 9.86E-02 | 4.51E-01 | 5.50E-01 | N/A | -- | N/A | -- |
| Cadmium | 21.6 | 1.70E-01 | 0.00E+00 | 0.00E+00 | 1.70E-01 | 1.53E-01 | 3.23E-01 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 616 | 1.29E+00 | 0.00E+00 | 0.00E+00 | 1.29E+00 | 4.36E+00 | 5.65E+00 | 2.66 | **2** | 15.6 | <1 |
| Copper | 5100 | 2.87E+00 | 0.00E+00 | 0.00E+00 | 2.87E+00 | 3.61E+01 | 3.90E+01 | 4.05 | **10** | 34.9 | **1** |
| Lead | 2120 | 9.92E-01 | 0.00E+00 | 0.00E+00 | 9.92E-01 | 1.50E+01 | 1.60E+01 | 1.63 | **10** | 44.6 | <1 |
| Mercury | 1.8 | 2.59E-02 | 0.00E+00 | 0.00E+00 | 2.59E-02 | 1.28E-02 | 3.87E-02 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 132 | 2.13E-01 | 0.00E+00 | 0.00E+00 | 2.13E-01 | 9.35E-01 | 1.15E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 4.4 | 1.33E-01 | 0.00E+00 | 0.00E+00 | 1.33E-01 | 3.12E-02 | 1.64E-01 | 0.29 | <1 | 0.61 | <1 |
| Silver | 84.5 | 6.03E-02 | 0.00E+00 | 0.00E+00 | 6.03E-02 | 5.99E-01 | 6.59E-01 | 2.02 | <1 | 60.47 | <1 |
| Vanadium | 51 | 1.26E-02 | 0.00E+00 | 0.00E+00 | 1.26E-02 | 3.61E-01 | 3.74E-01 | 0.344 | **1** | 1.19 | <1 |
| Zinc | 4280 | 2.55E+01 | 0.00E+00 | 0.00E+00 | 2.55E+01 | 3.03E+01 | 5.58E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 7.12E-03 | 0.00E+00 | 0.00E+00 | 7.12E-03 | 1.46E-02 | 2.17E-02 | 0.227 | <1 | 4.66 | <1 |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 0.213 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.51E-03 | 1.51E-03 | 0.18 | <1 | 1.8 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 2.20E-07 | 0.00E+00 | 0.00E+00 | 2.20E-07 | 2.90E-07 | 5.10E-07 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000259 | 1.39E-07 | 0.00E+00 | 0.00E+00 | 1.39E-07 | 1.84E-07 | 3.23E-07 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.199 | 5.06E-04 | 0.00E+00 | 0.00E+00 | 5.06E-04 | 1.41E-03 | 1.92E-03 | 1.1 | <1 | 11 | <1 |

| Analyte | EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 63.7 | 0.00E+00 | 9.55E+00 | 0.00E+00 | 9.55E+00 | 9.93E-01 | 1.05E+01 | N/A | -- | N/A | -- |
| Cadmium | 21.6 | 0.00E+00 | 3.82E+00 | 0.00E+00 | 3.82E+00 | 3.37E-01 | 4.16E+00 | 1.47 | **3** | 6.35 | <1 |
| Chromium | 616 | 0.00E+00 | 2.83E+01 | 0.00E+00 | 2.83E+01 | 9.60E+00 | 3.79E+01 | 2.66 | **14** | 15.6 | **2** |
| Copper | 5100 | 0.00E+00 | 7.62E+00 | 0.00E+00 | 7.62E+00 | 7.95E+01 | 8.71E+01 | 4.05 | **22** | 34.9 | **2** |
| Lead | 2120 | 0.00E+00 | 5.83E+01 | 0.00E+00 | 5.83E+01 | 3.31E+01 | 9.13E+01 | 1.63 | **56** | 44.6 | **2** |
| Mercury | 1.8 | 0.00E+00 | 1.98E-01 | 0.00E+00 | 1.98E-01 | 2.81E-02 | 2.26E-01 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 132 | 0.00E+00 | 2.10E+01 | 0.00E+00 | 2.10E+01 | 2.06E+00 | 2.30E+01 | 6.71 | **3** | 18.6 | **1** |
| Selenium | 4.4 | 0.00E+00 | 4.12E-01 | 0.00E+00 | 4.12E-01 | 6.86E-02 | 4.81E-01 | 0.29 | **2** | 0.61 | <1 |
| Silver | 84.5 | 0.00E+00 | 2.59E+01 | 0.00E+00 | 2.59E+01 | 1.32E+00 | 2.72E+01 | 2.02 | **13** | 60.47 | <1 |
| Vanadium | 51 | 0.00E+00 | 3.21E-01 | 0.00E+00 | 3.21E-01 | 7.95E-01 | 1.12E+00 | 0.344 | **3** | 1.19 | <1 |
| Zinc | 4280 | 0.00E+00 | 1.99E+02 | 0.00E+00 | 1.99E+02 | 6.67E+01 | 2.66E+02 | 66.1 | **4** | 171.4 | **2** |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 0.00E+00 | 3.46E+00 | 0.00E+00 | 3.46E+00 | 3.21E-02 | 3.49E+00 | 0.227 | **15** | 4.66 | <1 |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 0.213 | 0.00E+00 | 7.50E-02 | 0.00E+00 | 7.50E-02 | 3.32E-03 | 7.83E-02 | 0.18 | <1 | 1.8 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 0.00E+00 | 1.27E-04 | 0.00E+00 | 1.27E-04 | 6.39E-07 | 1.28E-04 | 0.000014 | **9** | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000259 | 0.00E+00 | 8.03E-05 | 0.00E+00 | 8.03E-05 | 4.04E-07 | 8.07E-05 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.199 | 0.00E+00 | 6.38E+00 | 0.00E+00 | 6.38E+00 | 3.10E-03 | 6.38E+00 | 1.1 | **6** | 11 | <1 |

**Table 12**
**Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 63.7 | 0.00E+00 | 0.00E+00 | 7.68E-03 | 7.68E-03 | 2.88E-01 | 2.96E-01 | N/A | -- | N/A | -- |
| Cadmium | 21.6 | 0.00E+00 | 0.00E+00 | 9.65E-02 | 9.65E-02 | 9.78E-02 | 1.94E-01 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 616 | 0.00E+00 | 0.00E+00 | 2.06E+00 | 2.06E+00 | 2.79E+00 | 4.85E+00 | 2.66 | **2** | 15.6 | <1 |
| Copper | 5100 | 0.00E+00 | 0.00E+00 | 2.98E+00 | 2.98E+00 | 2.31E+01 | 2.61E+01 | 4.05 | **6** | 34.9 | <1 |
| Lead | 2120 | 0.00E+00 | 0.00E+00 | 2.28E+00 | 2.28E+00 | 9.60E+00 | 1.19E+01 | 1.63 | **7** | 44.6 | <1 |
| Mercury | 1.8 | 0.00E+00 | 0.00E+00 | 7.76E-03 | 7.76E-03 | 8.15E-03 | 1.59E-02 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 132 | 0.00E+00 | 0.00E+00 | 6.04E-01 | 6.04E-01 | 5.98E-01 | 1.20E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 4.4 | 0.00E+00 | 0.00E+00 | 9.15E-02 | 9.15E-02 | 1.99E-02 | 1.11E-01 | 0.29 | <1 | 0.61 | <1 |
| Silver | 84.5 | 0.00E+00 | 0.00E+00 | 2.68E-02 | 2.68E-02 | 3.83E-01 | 4.09E-01 | 2.02 | <1 | 60.47 | <1 |
| Vanadium | 51 | 0.00E+00 | 0.00E+00 | 4.98E-02 | 4.98E-02 | 2.31E-01 | 2.81E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 4280 | 0.00E+00 | 0.00E+00 | 1.68E+01 | 1.68E+01 | 1.94E+01 | 3.62E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 0.00E+00 | 0.00E+00 | 8.86E+00 | 8.86E+00 | 9.33E-03 | 8.87E+00 | 0.227 | **39** | 4.66 | **2** |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 0.213 | 0.00E+00 | 0.00E+00 | 3.97E-02 | 3.97E-02 | 9.64E-04 | 4.07E-02 | 0.18 | <1 | 1.8 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 0.00E+00 | 0.00E+00 | 1.07E-05 | 1.07E-05 | 1.86E-07 | 1.09E-05 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000259 | 0.00E+00 | 0.00E+00 | 6.75E-06 | 6.75E-06 | 1.17E-07 | 6.86E-06 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.199 | 0.00E+00 | 0.00E+00 | 3.38E+00 | 3.38E+00 | 9.01E-04 | 3.38E+00 | 1.1 | **3** | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 63.7 | 4.34E-01 | 0.00E+00 | 0.00E+00 | 4.34E-01 | 4.57E-01 | 8.91E-01 | 0.059 | **15** | 2.76 | <1 |
| Cadmium | 21.6 | 7.46E-01 | 0.00E+00 | 0.00E+00 | 7.46E-01 | 1.55E-01 | 9.01E-01 | 0.77 | **1** | 6.9 | <1 |
| Chromium | 616 | 5.66E+00 | 0.00E+00 | 0.00E+00 | 5.66E+00 | 4.42E+00 | 1.01E+01 | 2.4 | **4** | 58.2 | <1 |
| Copper | 5100 | 1.26E+01 | 0.00E+00 | 0.00E+00 | 1.26E+01 | 3.66E+01 | 4.92E+01 | 5.6 | **9** | 82.7 | <1 |
| Lead | 2120 | 4.36E+00 | 0.00E+00 | 0.00E+00 | 4.36E+00 | 1.52E+01 | 1.96E+01 | 4.7 | **4** | 186.4 | <1 |
| Mercury | 1.8 | 1.14E-01 | 0.00E+00 | 0.00E+00 | 1.14E-01 | 1.29E-02 | 1.27E-01 | 1 | <1 | 10 | <1 |
| Nickel | 132 | 9.35E-01 | 0.00E+00 | 0.00E+00 | 9.35E-01 | 9.47E-01 | 1.88E+00 | 1.7 | **1** | 7.7 | <1 |
| Selenium | 4.4 | 5.84E-01 | 0.00E+00 | 0.00E+00 | 5.84E-01 | 3.16E-02 | 6.16E-01 | 0.14 | **4** | 0.44 | **1** |
| Silver | 84.5 | 2.65E-01 | 0.00E+00 | 0.00E+00 | 2.65E-01 | 6.06E-01 | 8.71E-01 | 6.02 | <1 | 118.62 | <1 |
| Vanadium | 51 | 5.55E-02 | 0.00E+00 | 0.00E+00 | 5.55E-02 | 3.66E-01 | 4.21E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 4280 | 1.12E+02 | 0.00E+00 | 0.00E+00 | 1.12E+02 | 3.07E+01 | 1.43E+02 | 75.4 | **2** | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 3.13E-02 | 0.00E+00 | 0.00E+00 | 3.13E-02 | 1.48E-02 | 4.61E-02 | 0.147 | <1 | 7.65 | <1 |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 0.213 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.53E-03 | 1.53E-03 | 2 | <1 | 4.1 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 9.68E-07 | 0.00E+00 | 0.00E+00 | 9.68E-07 | 2.94E-07 | 1.26E-06 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000259 | 6.11E-07 | 0.00E+00 | 0.00E+00 | 6.11E-07 | 1.86E-07 | 7.97E-07 | 0.000001 | <1 | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.199 | 2.22E-03 | 0.00E+00 | 0.00E+00 | 2.22E-03 | 1.43E-03 | 3.65E-03 | 18.3 | <1 | 183 | <1 |

**Table 12**
**Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 63.7 | 0.00E+00 | 8.54E+00 | 0.00E+00 | 8.54E+00 | 2.56E-01 | 8.79E+00 | 0.059 | **149** | 2.76 | **3** |
| Cadmium | 21.6 | 0.00E+00 | 3.41E+00 | 0.00E+00 | 3.41E+00 | 8.68E-02 | 3.50E+00 | 0.77 | **5** | 6.9 | <1 |
| Chromium | 616 | 0.00E+00 | 2.53E+01 | 0.00E+00 | 2.53E+01 | 2.48E+00 | 2.77E+01 | 2.4 | **12** | 58.2 | <1 |
| Copper | 5100 | 0.00E+00 | 6.81E+00 | 0.00E+00 | 6.81E+00 | 2.05E+01 | 2.73E+01 | 5.6 | **5** | 82.7 | <1 |
| Lead | 2120 | 0.00E+00 | 5.21E+01 | 0.00E+00 | 5.21E+01 | 8.52E+00 | 6.06E+01 | 4.7 | **13** | 186.4 | <1 |
| Mercury | 1.8 | 0.00E+00 | 1.77E-01 | 0.00E+00 | 1.77E-01 | 7.24E-03 | 1.84E-01 | 1 | <1 | 10 | <1 |
| Nickel | 132 | 0.00E+00 | 1.87E+01 | 0.00E+00 | 1.87E+01 | 5.31E-01 | 1.93E+01 | 1.7 | **11** | 7.7 | **3** |
| Selenium | 4.4 | 0.00E+00 | 3.68E-01 | 0.00E+00 | 3.68E-01 | 1.77E-02 | 3.86E-01 | 0.14 | **3** | 0.44 | <1 |
| Silver | 84.5 | 0.00E+00 | 2.32E+01 | 0.00E+00 | 2.32E+01 | 3.40E-01 | 2.35E+01 | 6.02 | **4** | 118.62 | <1 |
| Vanadium | 51 | 0.00E+00 | 2.87E-01 | 0.00E+00 | 2.87E-01 | 2.05E-01 | 4.92E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 4280 | 0.00E+00 | 1.78E+02 | 0.00E+00 | 1.78E+02 | 1.72E+01 | 1.95E+02 | 75.4 | **3** | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 0.00E+00 | 3.09E+00 | 0.00E+00 | 3.09E+00 | 8.29E-03 | 3.10E+00 | 0.147 | **21** | 7.65 | <1 |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 0.213 | 0.00E+00 | 6.70E-02 | 0.00E+00 | 6.70E-02 | 8.56E-04 | 6.79E-02 | 2 | <1 | 4.1 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 0.00E+00 | 1.14E-04 | 0.00E+00 | 1.14E-04 | 1.65E-07 | 1.14E-04 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000259 | 0.00E+00 | 7.18E-05 | 0.00E+00 | 7.18E-05 | 1.04E-07 | 7.19E-05 | 0.000001 | **72** | 0.00001 | **7** |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.199 | 0.00E+00 | 5.70E+00 | 0.00E+00 | 5.70E+00 | 8.00E-04 | 5.70E+00 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 63.7 | 0.00E+00 | 0.00E+00 | 3.66E-03 | 3.66E-03 | 6.75E-02 | 7.12E-02 | 0.059 | **1** | 2.76 | <1 |
| Cadmium | 21.6 | 0.00E+00 | 0.00E+00 | 4.60E-02 | 4.60E-02 | 2.29E-02 | 6.89E-02 | 0.77 | <1 | 6.9 | <1 |
| Chromium | 616 | 0.00E+00 | 0.00E+00 | 9.80E-01 | 9.80E-01 | 6.53E-01 | 1.63E+00 | 2.4 | <1 | 58.2 | <1 |
| Copper | 5100 | 0.00E+00 | 0.00E+00 | 1.42E+00 | 1.42E+00 | 5.41E+00 | 6.83E+00 | 5.6 | **1** | 82.7 | <1 |
| Lead | 2120 | 0.00E+00 | 0.00E+00 | 1.09E+00 | 1.09E+00 | 2.25E+00 | 3.33E+00 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 1.8 | 0.00E+00 | 0.00E+00 | 3.70E-03 | 3.70E-03 | 1.91E-03 | 5.61E-03 | 1 | <1 | 10 | <1 |
| Nickel | 132 | 0.00E+00 | 0.00E+00 | 2.88E-01 | 2.88E-01 | 1.40E-01 | 4.28E-01 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 4.4 | 0.00E+00 | 0.00E+00 | 4.36E-02 | 4.36E-02 | 4.67E-03 | 4.83E-02 | 0.14 | <1 | 0.44 | <1 |
| Silver | 84.5 | 0.00E+00 | 0.00E+00 | 1.28E-02 | 1.28E-02 | 8.96E-02 | 1.02E-01 | 6.02 | <1 | 118.62 | <1 |
| Vanadium | 51 | 0.00E+00 | 0.00E+00 | 2.38E-02 | 2.38E-02 | 5.41E-02 | 7.78E-02 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 4280 | 0.00E+00 | 0.00E+00 | 8.01E+00 | 8.01E+00 | 4.54E+00 | 1.26E+01 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 0.00E+00 | 0.00E+00 | 4.22E+00 | 4.22E+00 | 2.19E-03 | 4.22E+00 | 0.147 | **29** | 7.65 | <1 |
| **Polychlorinated Biphenyls (PCBs)** | | | | | | | | | | | |
| Aroclor 1260 | 0.213 | 0.00E+00 | 0.00E+00 | 1.89E-02 | 1.89E-02 | 2.26E-04 | 1.92E-02 | 2 | <1 | 4.1 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 0.00E+00 | 0.00E+00 | 5.09E-06 | 5.09E-06 | 4.35E-08 | 5.13E-06 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000259 | 0.00E+00 | 0.00E+00 | 3.22E-06 | 3.22E-06 | 2.75E-08 | 3.24E-06 | 0.000001 | **3** | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.199 | 0.00E+00 | 0.00E+00 | 1.61E+00 | 1.61E+00 | 2.11E-04 | 1.61E+00 | 18.3 | <1 | 183 | <1 |

**Table 12**
**Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 13**
**Aquatic and Semi-Aquatic Dose Rate Model Output (Upgradient Drainage)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Marsh wren (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 13.3 | -- | 4.62E-01 | 0.00E+00 | 4.62E-01 | -- | 7.28E-02 | 5.35E-01 | 2.24 | <1 | 4.51 | <1 |
| Cadmium | 1.5 | -- | 1.52E-02 | 0.00E+00 | 1.52E-02 | -- | 8.21E-03 | 2.34E-02 | 1.47 | <1 | 6.35 | <1 |
| Copper | 56.5 | -- | 2.63E+00 | 0.00E+00 | 2.63E+00 | -- | 3.09E-01 | 2.94E+00 | 4.05 | <1 | 34.9 | <1 |
| Lead | 96.9 | -- | 1.75E+00 | 0.00E+00 | 1.75E+00 | -- | 5.31E-01 | 2.28E+00 | 1.63 | **1** | 44.6 | <1 |
| Mercury | 0.49 | -- | 2.33E-02 | 0.00E+00 | 2.33E-02 | -- | 2.68E-03 | 2.60E-02 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 18.5 | -- | 8.10E-01 | 0.00E+00 | 8.10E-01 | -- | 1.01E-01 | 9.12E-01 | 6.71 | <1 | 18.6 | <1 |
| Silver | 1.5 | -- | 4.11E-01 | 0.00E+00 | 4.11E-01 | -- | 8.21E-03 | 4.19E-01 | 2.02 | <1 | 60.47 | <1 |
| Vanadium | 31.6 | -- | 7.16E-01 | 0.00E+00 | 7.16E-01 | -- | 1.73E-01 | 8.89E-01 | 0.344 | **3** | 1.19 | <1 |
| Zinc | 324 | -- | 1.92E+01 | 0.00E+00 | 1.92E+01 | -- | 1.77E+00 | 2.09E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 8.00E-01 | 0.00E+00 | 8.00E-01 | -- | 1.17E-03 | 8.02E-01 | 0.227 | **4** | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.161 | -- | 5.67E-01 | 0.00E+00 | 5.67E-01 | -- | 8.82E-04 | 5.68E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Osprey (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 13.3 | -- | 0.00E+00 | 1.31E-01 | 1.31E-01 | -- | 0.00E+00 | 1.31E-01 | 2.24 | <1 | 4.51 | <1 |
| Cadmium | 1.5 | -- | 0.00E+00 | 4.30E-03 | 4.30E-03 | -- | 0.00E+00 | 4.30E-03 | 1.47 | <1 | 6.35 | <1 |
| Copper | 56.5 | -- | 0.00E+00 | 7.44E-01 | 7.44E-01 | -- | 0.00E+00 | 7.44E-01 | 4.05 | <1 | 34.9 | <1 |
| Lead | 96.9 | -- | 0.00E+00 | 4.95E-01 | 4.95E-01 | -- | 0.00E+00 | 4.95E-01 | 1.63 | <1 | 44.6 | <1 |
| Mercury | 0.49 | -- | 0.00E+00 | 6.58E-03 | 6.58E-03 | -- | 0.00E+00 | 6.58E-03 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 18.5 | -- | 0.00E+00 | 2.29E-01 | 2.29E-01 | -- | 0.00E+00 | 2.29E-01 | 6.71 | <1 | 18.6 | <1 |
| Silver | 1.5 | -- | 0.00E+00 | 1.16E-01 | 1.16E-01 | -- | 0.00E+00 | 1.16E-01 | 2.02 | <1 | 60.47 | <1 |
| Vanadium | 31.6 | -- | 0.00E+00 | 2.03E-01 | 2.03E-01 | -- | 0.00E+00 | 2.03E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 324 | -- | 0.00E+00 | 5.42E+00 | 5.42E+00 | -- | 0.00E+00 | 5.42E+00 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 0.00E+00 | 2.26E-01 | 2.26E-01 | -- | 0.00E+00 | 2.26E-01 | 0.227 | <1 | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.161 | -- | 0.00E+00 | 1.60E-01 | 1.60E-01 | -- | 0.00E+00 | 1.60E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Raccoon (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 13.3 | -- | 2.48E-02 | 0.00E+00 | 2.48E-02 | -- | 1.84E-02 | 4.32E-02 | 1.04 | <1 | 4.55 | <1 |
| Cadmium | 1.5 | -- | 8.15E-04 | 0.00E+00 | 8.15E-04 | -- | 2.07E-03 | 2.89E-03 | 0.77 | <1 | 6.9 | <1 |
| Copper | 56.5 | -- | 1.41E-01 | 0.00E+00 | 1.41E-01 | -- | 7.80E-02 | 2.19E-01 | 5.6 | <1 | 82.7 | <1 |
| Lead | 96.9 | -- | 9.40E-02 | 0.00E+00 | 9.40E-02 | -- | 1.34E-01 | 2.28E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.49 | -- | 1.25E-03 | 0.00E+00 | 1.25E-03 | -- | 6.77E-04 | 1.93E-03 | 1 | <1 | 10 | <1 |
| Nickel | 18.5 | -- | 4.35E-02 | 0.00E+00 | 4.35E-02 | -- | 2.55E-02 | 6.90E-02 | 1.7 | <1 | 7.7 | <1 |
| Silver | 1.5 | -- | 2.20E-02 | 0.00E+00 | 2.20E-02 | -- | 2.07E-03 | 2.41E-02 | 6.02 | <1 | 118.62 | <1 |
| Vanadium | 31.6 | -- | 3.84E-02 | 0.00E+00 | 3.84E-02 | -- | 4.36E-02 | 8.21E-02 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 324 | -- | 1.03E+00 | 0.00E+00 | 1.03E+00 | -- | 4.47E-01 | 1.48E+00 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 4.30E-02 | 0.00E+00 | 4.30E-02 | -- | 2.95E-04 | 4.33E-02 | 0.147 | <1 | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.161 | -- | 3.04E-02 | 0.00E+00 | 3.04E-02 | -- | 2.22E-04 | 3.06E-02 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | American Mink (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 13.3 | -- | 0.00E+00 | 8.21E-02 | 8.21E-02 | -- | 0.00E+00 | 8.21E-02 | 1.04 | <1 | 4.55 | <1 |
| Cadmium | 1.5 | -- | 0.00E+00 | 2.70E-03 | 2.70E-03 | -- | 0.00E+00 | 2.70E-03 | 0.77 | <1 | 6.9 | <1 |
| Copper | 56.5 | -- | 0.00E+00 | 4.67E-01 | 4.67E-01 | -- | 0.00E+00 | 4.67E-01 | 5.6 | <1 | 82.7 | <1 |
| Lead | 96.9 | -- | 0.00E+00 | 3.11E-01 | 3.11E-01 | -- | 0.00E+00 | 3.11E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | 0.49 | -- | 0.00E+00 | 4.13E-03 | 4.13E-03 | -- | 0.00E+00 | 4.13E-03 | 1 | <1 | 10 | <1 |
| Nickel | 18.5 | -- | 0.00E+00 | 1.44E-01 | 1.44E-01 | -- | 0.00E+00 | 1.44E-01 | 1.7 | <1 | 7.7 | <1 |
| Silver | 1.5 | -- | 0.00E+00 | 7.29E-02 | 7.29E-02 | -- | 0.00E+00 | 7.29E-02 | 6.02 | <1 | 118.62 | <1 |
| Vanadium | 31.6 | -- | 0.00E+00 | 1.27E-01 | 1.27E-01 | -- | 0.00E+00 | 1.27E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 324 | -- | 0.00E+00 | 3.40E+00 | 3.40E+00 | -- | 0.00E+00 | 3.40E+00 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 0.00E+00 | 1.42E-01 | 1.42E-01 | -- | 0.00E+00 | 1.42E-01 | 0.147 | <1 | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.161 | -- | 0.00E+00 | 1.01E-01 | 1.01E-01 | -- | 0.00E+00 | 1.01E-01 | 18.3 | <1 | 183 | <1 |

**Table 13**
**Aquatic and Semi-Aquatic Dose Rate Model Output (Upgradient Drainage)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 14**
**Aquatic and Semi-Aquatic Dose Rate Model Output (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Marsh wren (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 28000 | -- | 7.67E+03 | 0.00E+00 | 7.67E+03 | -- | 1.53E+02 | 7.82E+03 | 109.7 | **71** | 1097 | **7** |
| Arsenic | 21.3 | 0.0117 | 7.41E-01 | 0.00E+00 | 7.41E-01 | 3.16E-03 | 1.17E-01 | 8.60E-01 | 2.24 | <1 | 4.51 | <1 |
| Chromium | 59 | 0.002 | 9.50E+00 | 0.00E+00 | 9.50E+00 | 5.39E-04 | 3.23E-01 | 9.82E+00 | 2.66 | **4** | 15.6 | <1 |
| Copper | 21.9 | 0.0049 | 1.02E+00 | 0.00E+00 | 1.02E+00 | 1.32E-03 | 1.20E-01 | 1.14E+00 | 4.05 | <1 | 34.9 | <1 |
| Lead | 45.3 | 0.004 | 8.19E-01 | 0.00E+00 | 8.19E-01 | 1.08E-03 | 2.48E-01 | 1.07E+00 | 1.63 | <1 | 44.6 | <1 |
| Mercury | -- | 0.000091 | -- | -- | -- | 2.45E-05 | -- | 2.45E-05 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 26 | -- | 1.14E+00 | 0.00E+00 | 1.14E+00 | -- | 1.42E-01 | 1.28E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 3.4 | 0.0118 | 1.32E+00 | 0.00E+00 | 1.32E+00 | 3.18E-03 | 1.86E-02 | 1.35E+00 | 0.29 | **5** | 0.61 | **2** |
| Vanadium | 77 | -- | 1.36E+00 | 0.00E+00 | 1.36E+00 | -- | 4.22E-01 | 1.78E+00 | 0.344 | **5** | 1.19 | **1** |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000039 | -- | 1.47E-05 | 0.00E+00 | 1.47E-05 | -- | 2.13E-08 | 1.47E-05 | 0.000014 | **1** | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000049 | -- | 1.84E-05 | 0.00E+00 | 1.84E-05 | -- | 2.67E-08 | 1.84E-05 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 162 | -- | 5.70E+02 | 0.00E+00 | 5.70E+02 | -- | 8.87E-01 | 5.71E+02 | 1.1 | **519** | 11 | **52** |
| Di-n-octyl phthalate | 3.08 | -- | 1.04E+01 | 0.00E+00 | 1.04E+01 | -- | 1.69E-02 | 1.04E+01 | N/A | -- | N/A | -- |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Osprey (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 28000 | -- | 0.00E+00 | 2.17E+03 | 2.17E+03 | -- | 0.00E+00 | 2.17E+03 | 109.7 | **20** | 1097 | **2** |
| Arsenic | 21.3 | 0.0117 | 0.00E+00 | 2.09E-01 | 2.09E-01 | 6.46E-04 | 0.00E+00 | 2.10E-01 | 2.24 | <1 | 4.51 | <1 |
| Chromium | 59 | 0.002 | 0.00E+00 | 2.69E+00 | 2.69E+00 | 1.11E-04 | 0.00E+00 | 2.69E+00 | 2.66 | **1** | 15.6 | <1 |
| Copper | 21.9 | 0.0049 | 0.00E+00 | 2.88E-01 | 2.88E-01 | 2.71E-04 | 0.00E+00 | 2.88E-01 | 4.05 | <1 | 34.9 | <1 |
| Lead | 45.3 | 0.004 | 0.00E+00 | 2.31E-01 | 2.31E-01 | 2.21E-04 | 0.00E+00 | 2.32E-01 | 1.63 | <1 | 44.6 | <1 |
| Mercury | -- | 0.000091 | -- | -- | -- | 5.03E-06 | -- | 5.03E-06 | 0.45 | <1 | 0.9 | <1 |
| Nickel | 26 | -- | 0.00E+00 | 3.22E-01 | 3.22E-01 | -- | 0.00E+00 | 3.22E-01 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 3.4 | 0.0118 | 0.00E+00 | 3.74E-01 | 3.74E-01 | 6.52E-04 | 0.00E+00 | 3.75E-01 | 0.29 | **1** | 0.61 | <1 |
| Vanadium | 77 | -- | 0.00E+00 | 3.85E-01 | 3.85E-01 | -- | 0.00E+00 | 3.85E-01 | 0.344 | **1** | 1.19 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000039 | -- | 0.00E+00 | 4.15E-06 | 4.15E-06 | -- | 0.00E+00 | 4.15E-06 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000049 | -- | 0.00E+00 | 5.21E-06 | 5.21E-06 | -- | 0.00E+00 | 5.21E-06 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 162 | -- | 0.00E+00 | 1.61E+02 | 1.61E+02 | -- | 0.00E+00 | 1.61E+02 | 1.1 | **147** | 11 | **15** |
| Di-n-octyl phthalate | 3.08 | -- | 0.00E+00 | 2.93E+00 | 2.93E+00 | -- | 0.00E+00 | 2.93E+00 | N/A | -- | N/A | -- |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Raccoon (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 28000 | -- | 4.11E+02 | 0.00E+00 | 4.11E+02 | -- | 3.87E+01 | 4.50E+02 | 1.93 | **233** | 19.3 | **23** |
| Arsenic | 21.3 | 0.0117 | 3.97E-02 | 0.00E+00 | 3.97E-02 | 9.82E-04 | 2.94E-02 | 7.01E-02 | 1.04 | <1 | 4.55 | <1 |
| Chromium | 59 | 0.002 | 5.10E-01 | 0.00E+00 | 5.10E-01 | 1.68E-04 | 8.15E-02 | 5.91E-01 | 2.4 | <1 | 58.2 | <1 |
| Copper | 21.9 | 0.0049 | 5.47E-02 | 0.00E+00 | 5.47E-02 | 4.11E-04 | 3.02E-02 | 8.54E-02 | 5.6 | <1 | 82.7 | <1 |
| Lead | 45.3 | 0.004 | 4.39E-02 | 0.00E+00 | 4.39E-02 | 3.36E-04 | 6.26E-02 | 1.07E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | -- | 0.000091 | -- | -- | -- | 7.64E-06 | -- | 7.64E-06 | 1 | <1 | 10 | <1 |
| Nickel | 26 | -- | 6.11E-02 | 0.00E+00 | 6.11E-02 | -- | 3.59E-02 | 9.70E-02 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 3.4 | 0.0118 | 7.10E-02 | 0.00E+00 | 7.10E-02 | 9.91E-04 | 4.70E-03 | 7.67E-02 | 0.14 | <1 | 0.44 | <1 |
| Vanadium | 77 | -- | 7.31E-02 | 0.00E+00 | 7.31E-02 | -- | 1.06E-01 | 1.79E-01 | 4.16 | <1 | 5.92 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000039 | -- | 7.87E-07 | 0.00E+00 | 7.87E-07 | -- | 5.36E-09 | 7.92E-07 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000049 | -- | 9.88E-07 | 0.00E+00 | 9.88E-07 | -- | 6.73E-09 | 9.95E-07 | 0.000001 | <1 | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 162 | -- | 3.06E+01 | 0.00E+00 | 3.06E+01 | -- | 2.24E-01 | 3.08E+01 | 18.3 | **2** | 183 | <1 |
| Di-n-octyl phthalate | 3.08 | -- | 5.57E-01 | 0.00E+00 | 5.57E-01 | -- | 4.25E-03 | 5.61E-01 | 65.1 | <1 | 651 | <1 |

**Table 14**
**Aquatic and Semi-Aquatic Dose Rate Model Output (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | American Mink (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 28000 | -- | 0.00E+00 | 1.36E+03 | 1.36E+03 | -- | 0.00E+00 | 1.36E+03 | 1.93 | **705** | 19.3 | **71** |
| Arsenic | 21.3 | 0.0117 | 0.00E+00 | 1.31E-01 | 1.31E-01 | 1.16E-03 | 0.00E+00 | 1.33E-01 | 1.04 | <1 | 4.55 | <1 |
| Chromium | 59 | 0.002 | 0.00E+00 | 1.69E+00 | 1.69E+00 | 1.98E-04 | 0.00E+00 | 1.69E+00 | 2.4 | <1 | 58.2 | <1 |
| Copper | 21.9 | 0.0049 | 0.00E+00 | 1.81E-01 | 1.81E-01 | 4.85E-04 | 0.00E+00 | 1.81E-01 | 5.6 | <1 | 82.7 | <1 |
| Lead | 45.3 | 0.004 | 0.00E+00 | 1.45E-01 | 1.45E-01 | 3.96E-04 | 0.00E+00 | 1.46E-01 | 4.7 | <1 | 186.4 | <1 |
| Mercury | -- | 0.000091 | -- | -- | -- | 9.01E-06 | -- | 9.01E-06 | 1 | <1 | 10 | <1 |
| Nickel | 26 | -- | 0.00E+00 | 2.02E-01 | 2.02E-01 | -- | 0.00E+00 | 2.02E-01 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 3.4 | 0.0118 | 0.00E+00 | 2.35E-01 | 2.35E-01 | 1.17E-03 | 0.00E+00 | 2.36E-01 | 0.14 | **2** | 0.44 | <1 |
| Vanadium | 77 | -- | 0.00E+00 | 2.42E-01 | 2.42E-01 | -- | 0.00E+00 | 2.42E-01 | 4.16 | <1 | 5.92 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000039 | -- | 0.00E+00 | 2.60E-06 | 2.60E-06 | -- | 0.00E+00 | 2.60E-06 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000049 | -- | 0.00E+00 | 3.27E-06 | 3.27E-06 | -- | 0.00E+00 | 3.27E-06 | 0.000001 | **3** | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 162 | -- | 0.00E+00 | 1.01E+02 | 1.01E+02 | -- | 0.00E+00 | 1.01E+02 | 18.3 | **6** | 183 | <1 |
| Di-n-octyl phthalate | 3.08 | -- | 0.00E+00 | 1.84E+00 | 1.84E+00 | -- | 0.00E+00 | 1.84E+00 | 65.1 | <1 | 651 | <1 |

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

$EDD_{diet}$ = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
$IR_{diet}$ = Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
$C_{soil}$ = COPEC concentration in soil (mg COPEC/kg soil, dry weight)
$DF_i$ = Dietary fraction of food item *i*
AUF = Area use factor accounts for receptor home range
BW = Body weight of the receptor, wet weight
$EDD_{substrate}$ = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day)
$IR_{substrate}$ = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight)
$C_{substrate}$ = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

# Attachment C

ProUCL 5.1 Output

**Attachment C**
**ProUCL 5.1 Output**

| UCL Statistics for Data Sets with Non-Detects | |
|---|---|
| User Selected Options | |
| Date/Time of Computation | ProUCL 5.112/20/2020 4:21:36 AM |
| From File | WorkSheet.xls |
| Full Precision | OFF |
| Confidence Coefficient | 95% |
| Number of Bootstrap Operations | 2000 |

**Conc (pw | downgradient estuarine | 7439-95-4 | tmet | n/a | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 11 | Number of Distinct Observations | 4 |
| | | Number of Missing Observations | 0 |
| Minimum | 900000 | Mean | 1063636 |
| Maximum | 1200000 | Median | 1100000 |
| SD | 92442 | Std. Error of Mean | 27872 |
| Coefficient of Variation | 0.0869 | Skewness | -0.023 |

**Normal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.905 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.209 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level |

**Data appear Normal at 5% Significance Level**

**Assuming Normal Distribution**

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 1114154 | 95% Adjusted-CLT UCL (Chen-1995) | 1109275 |
| | | 95% Modified-t UCL (Johnson-1978) | 1114121 |

**Gamma GOF Test**

| | | |
|---|---|---|
| A-D Test Statistic | 0.589 | **Anderson-Darling Gamma GOF Test** |
| 5% A-D Critical Value | 0.726 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.215 | **Kolmogorov-Smirnov Gamma GOF Test** |
| 5% K-S Critical Value | 0.254 | Detected data appear Gamma Distributed at 5% Significance Level |

**Detected data appear Gamma Distributed at 5% Significance Level**

**Gamma Statistics**

| | | | |
|---|---|---|---|
| k hat (MLE) | 144.5 | k star (bias corrected MLE) | 105.2 |
| Theta hat (MLE) | 7361 | Theta star (bias corrected MLE) | 10115 |
| nu hat (MLE) | 3179 | nu star (bias corrected) | 2313 |
| MLE Mean (bias corrected) | 1063636 | MLE Sd (bias corrected) | 103725 |
| | | Approximate Chi Square Value (0.05) | 2203 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 2185 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 1117110 | 95% Adjusted Gamma UCL (use when n<50) | 1126133 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.905 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.21 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 13.71 | Mean of logged Data | 13.87 |
| Maximum of Logged Data | 14 | SD of logged Data | 0.0875 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | N/A | 90% Chebyshev (MVUE) UCL | 1147934 |
| 95% Chebyshev (MVUE) UCL | 1186109 | 97.5% Chebyshev (MVUE) UCL | 1239095 |
| 99% Chebyshev (MVUE) UCL | 1343175 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 1109482 | 95% Jackknife UCL | 1114154 |
| 95% Standard Bootstrap UCL | N/A | 95% Bootstrap-t UCL | N/A |
| 95% Hall's Bootstrap UCL | N/A | 95% Percentile Bootstrap UCL | N/A |
| 95% BCA Bootstrap UCL | N/A | | |
| 90% Chebyshev(Mean, Sd) UCL | 1147253 | 95% Chebyshev(Mean, Sd) UCL | 1185128 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1237698 | 99% Chebyshev(Mean, Sd) UCL | 1340961 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 1114154 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be** | | | |
| **reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.** | | | |
| | | | |
| | | | |
| **Conc (pw \| downgradient estuarine \| 7439-96-5 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Minimum | 34 | Mean | 66.73 |
| Maximum | 140 | Median | 50 |
| SD | 35.87 | Std. Error of Mean | 10.82 |
| Coefficient of Variation | 0.538 | Skewness | 1.481 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.769 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.296 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 86.33 | 95% Adjusted-CLT UCL (Chen-1995) | 89.68 |
| | | 95% Modified-t UCL (Johnson-1978) | 87.14 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.836 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.732 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.281 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.256 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 4.831 | k star (bias corrected MLE) | 3.574 |
| Theta hat (MLE) | 13.81 | Theta star (bias corrected MLE) | 18.67 |
| nu hat (MLE) | 106.3 | nu star (bias corrected) | 78.63 |
| MLE Mean (bias corrected) | 66.73 | MLE Sd (bias corrected) | 35.3 |
| | | Approximate Chi Square Value (0.05) | 59.2 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 56.46 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 88.63 | 95% Adjusted Gamma UCL (use when n<50) | 92.93 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.875 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.257 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data Not Lognormal at 5% Significance Level | |
| Data appear Approximate Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 3.526 | Mean of logged Data | 4.094 |
| Maximum of Logged Data | 4.942 | SD of logged Data | 0.462 |
| | | | |
| **Assuming Lognormal Distribution** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% H-UCL | 91.08 | 90% Chebyshev (MVUE) UCL | 94.14 |
| 95% Chebyshev (MVUE) UCL | 106.9 | 97.5% Chebyshev (MVUE) UCL | 124.6 |
| 99% Chebyshev (MVUE) UCL | 159.3 | | |

**Nonparametric Distribution Free UCL Statistics**

Data appear to follow a Discernible Distribution at 5% Significance Level

**Nonparametric Distribution Free UCLs**

| | | | |
|---|---|---|---|
| 95% CLT UCL | 84.52 | 95% Jackknife UCL | 86.33 |
| 95% Standard Bootstrap UCL | 83.31 | 95% Bootstrap-t UCL | 109.9 |
| 95% Hall's Bootstrap UCL | 187.8 | 95% Percentile Bootstrap UCL | 84.73 |
| 95% BCA Bootstrap UCL | 88.18 | | |
| 90% Chebyshev(Mean, Sd) UCL | 99.17 | 95% Chebyshev(Mean, Sd) UCL | 113.9 |
| 97.5% Chebyshev(Mean, Sd) UCL | 134.3 | 99% Chebyshev(Mean, Sd) UCL | 174.3 |

**Suggested UCL to Use**

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 86.33 | or 95% Modified-t UCL | 87.14 |
| or 95% H-UCL | 91.08 | | |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

It is therefore recommended to avoid the use of H-statistic based 95% UCLs.

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

**Conc (pw | downgradient estuarine | 7440-09-7 | tmet | n/a | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 11 | Number of Distinct Observations | 7 |
| | | Number of Missing Observations | 0 |
| Minimum | 330000 | Mean | 376364 |
| Maximum | 500000 | Median | 380000 |
| SD | 48015 | Std. Error of Mean | 14477 |
| Coefficient of Variation | 0.128 | Skewness | 1.778 |

**Normal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.804 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.22 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level |

Data appear Approximate Normal at 5% Significance Level

**Attachment C**
**ProUCL 5.1 Output**

| Assuming Normal Distribution | | | |
|---|---|---|---|
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 402603 | 95% Adjusted-CLT UCL (Chen-1995) | 408468 |
| | | 95% Modified-t UCL (Johnson-1978) | 403896 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.686 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.727 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.193 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.255 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 74.69 | k star (bias corrected MLE) | 54.38 |
| Theta hat (MLE) | 5039 | Theta star (bias corrected MLE) | 6921 |
| nu hat (MLE) | 1643 | nu star (bias corrected) | 1196 |
| MLE Mean (bias corrected) | 376364 | MLE Sd (bias corrected) | 51037 |
| | | Approximate Chi Square Value (0.05) | 1117 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 1105 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 403083 | 95% Adjusted Gamma UCL (use when n<50) | 407650 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.846 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.194 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Approximate Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 12.71 | Mean of logged Data | 12.83 |
| Maximum of Logged Data | 13.12 | SD of logged Data | 0.119 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 402804 | 90% Chebyshev (MVUE) UCL | 416707 |
| 95% Chebyshev (MVUE) UCL | 435033 | 97.5% Chebyshev (MVUE) UCL | 460469 |
| 99% Chebyshev (MVUE) UCL | 510433 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 400176 | 95% Jackknife UCL | 402603 |
| 95% Standard Bootstrap UCL | 399061 | 95% Bootstrap-t UCL | 417481 |
| 95% Hall's Bootstrap UCL | 515198 | 95% Percentile Bootstrap UCL | 400909 |
| 95% BCA Bootstrap UCL | 406364 | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 90% Chebyshev(Mean, Sd) UCL | 419795 | 95% Chebyshev(Mean, Sd) UCL | 439468 |
| 97.5% Chebyshev(Mean, Sd) UCL | 466773 | 99% Chebyshev(Mean, Sd) UCL | 520409 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 402603 | | |
| | | | |
| When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test | | | |
| When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL | | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (pw \| downgradient estuarine \| 7440-23-5 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 7500000 | Mean | 10054545 |
| Maximum | 22000000 | Median | 8800000 |
| SD | 4029730 | Std. Error of Mean | 1215009 |
| Coefficient of Variation | 0.401 | Skewness | 3.115 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.52 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.414 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 12256703 | 95% Adjusted-CLT UCL (Chen-1995) | 13272479 |
| | | 95% Modified-t UCL (Johnson-1978) | 12446908 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 1.941 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.729 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.376 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.255 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 10.81 | k star (bias corrected MLE) | 7.921 |
| Theta hat (MLE) | 930245 | Theta star (bias corrected MLE) | 1269301 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| nu hat (MLE) | 237.8 | nu star (bias corrected) | 174.3 |
| MLE Mean (bias corrected) | 10054545 | MLE Sd (bias corrected) | 3572428 |
| | | Approximate Chi Square Value (0.05) | 144.7 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 140.4 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 12105874 | 95% Adjusted Gamma UCL (use when n<50) | 12484172 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.627 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.352 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 15.83 | Mean of logged Data | 16.08 |
| Maximum of Logged Data | 16.91 | SD of logged Data | 0.288 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 11926359 | 90% Chebyshev (MVUE) UCL | 12572108 |
| 95% Chebyshev (MVUE) UCL | 13755305 | 97.5% Chebyshev (MVUE) UCL | 15397538 |
| 99% Chebyshev (MVUE) UCL | 18623386 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 12053058 | 95% Jackknife UCL | 12256703 |
| 95% Standard Bootstrap UCL | 11923097 | 95% Bootstrap-t UCL | 19456776 |
| 95% Hall's Bootstrap UCL | 20918189 | 95% Percentile Bootstrap UCL | 12409091 |
| 95% BCA Bootstrap UCL | 13381818 | | |
| 90% Chebyshev(Mean, Sd) UCL | 13699574 | 95% Chebyshev(Mean, Sd) UCL | 15350649 |
| 97.5% Chebyshev(Mean, Sd) UCL | 17642277 | 99% Chebyshev(Mean, Sd) UCL | 22143737 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 12256703 | or 95% Modified-t UCL | 12446908 |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (pw \| downgradient estuarine \| 7440-38-2 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Total Number of Observations | 11 | Number of Distinct Observations | 10 |
| | | Number of Missing Observations | 0 |
| Minimum | 6.3 | Mean | 18.89 |
| Maximum | 36 | Median | 18 |
| SD | 10.99 | Std. Error of Mean | 3.313 |
| Coefficient of Variation | 0.582 | Skewness | 0.584 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.879 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.189 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level | |
| **Data appear Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 24.89 | 95% Adjusted-CLT UCL (Chen-1995) | 24.96 |
| | | 95% Modified-t UCL (Johnson-1978) | 24.99 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.381 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.733 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.173 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.257 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 3.217 | k star (bias corrected MLE) | 2.4 |
| Theta hat (MLE) | 5.873 | Theta star (bias corrected MLE) | 7.872 |
| nu hat (MLE) | 70.76 | nu star (bias corrected) | 52.8 |
| MLE Mean (bias corrected) | 18.89 | MLE Sd (bias corrected) | 12.19 |
| | | Approximate Chi Square Value (0.05) | 37.11 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 34.97 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 26.88 | 95% Adjusted Gamma UCL (use when n<50) | 28.52 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.934 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.154 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.841 | Mean of logged Data | 2.775 |
| Maximum of Logged Data | 3.584 | SD of logged Data | 0.611 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 30.35 | 90% Chebyshev (MVUE) UCL | 29.77 |
| 95% Chebyshev (MVUE) UCL | 34.66 | 97.5% Chebyshev (MVUE) UCL | 41.45 |
| 99% Chebyshev (MVUE) UCL | 54.79 | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 24.34 | 95% Jackknife UCL | 24.89 |
| 95% Standard Bootstrap UCL | 24.17 | 95% Bootstrap-t UCL | 26.25 |
| 95% Hall's Bootstrap UCL | 23.83 | 95% Percentile Bootstrap UCL | 24.02 |
| 95% BCA Bootstrap UCL | 24.43 | | |
| 90% Chebyshev(Mean, Sd) UCL | 28.83 | 95% Chebyshev(Mean, Sd) UCL | 33.33 |
| 97.5% Chebyshev(Mean, Sd) UCL | 39.58 | 99% Chebyshev(Mean, Sd) UCL | 51.85 |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 24.89 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (pw \| downgradient estuarine \| 7440-39-3 \| tmet \| n/a \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 14 | Mean | 27.91 |
| Maximum | 52 | Median | 25 |
| SD | 13.19 | Std. Error of Mean | 3.978 |
| Coefficient of Variation | 0.473 | Skewness | 0.927 |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.86 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.285 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data Not Normal at 5% Significance Level | |
| Data appear Approximate Normal at 5% Significance Level | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 35.12 | 95% Adjusted-CLT UCL (Chen-1995) | 35.64 |
| | | 95% Modified-t UCL (Johnson-1978) | 35.3 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.5 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.731 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.234 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.256 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 5.387 | k star (bias corrected MLE) | 3.978 |
| Theta hat (MLE) | 5.181 | Theta star (bias corrected MLE) | 7.016 |
| nu hat (MLE) | 118.5 | nu star (bias corrected) | 87.52 |
| MLE Mean (bias corrected) | 27.91 | MLE Sd (bias corrected) | 13.99 |
| | | Approximate Chi Square Value (0.05) | 66.95 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 64.03 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 36.48 | 95% Adjusted Gamma UCL (use when n<50) | 38.15 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.913 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.205 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.639 | Mean of logged Data | 3.233 |
| Maximum of Logged Data | 3.951 | SD of logged Data | 0.454 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 38.12 | 90% Chebyshev (MVUE) UCL | 39.48 |
| 95% Chebyshev (MVUE) UCL | 44.75 | 97.5% Chebyshev (MVUE) UCL | 52.07 |
| 99% Chebyshev (MVUE) UCL | 66.45 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 34.45 | 95% Jackknife UCL | 35.12 |
| 95% Standard Bootstrap UCL | 34.12 | 95% Bootstrap-t UCL | 36.9 |
| 95% Hall's Bootstrap UCL | 37.56 | 95% Percentile Bootstrap UCL | 34.18 |
| 95% BCA Bootstrap UCL | 34.82 | | |
| 90% Chebyshev(Mean, Sd) UCL | 39.84 | 95% Chebyshev(Mean, Sd) UCL | 45.25 |
| 97.5% Chebyshev(Mean, Sd) UCL | 52.75 | 99% Chebyshev(Mean, Sd) UCL | 67.49 |
| | | | |
| **Suggested UCL to Use** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 35.12 | | |
| | | | |
| When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test | | | |
| When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL | | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Conc (pw \| downgradient estuarine \| 7440-43-9 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 6 |
| Number of Detects | 8 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 5 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 0.6 | Minimum Non-Detect | 2500 |
| Maximum Detect | 1.2 | Maximum Non-Detect | 2500 |
| Variance Detects | 0.0741 | Percent Non-Detects | 27.27% |
| Mean Detects | 0.863 | SD Detects | 0.272 |
| Median Detects | 0.8 | CV Detects | 0.316 |
| Skewness Detects | 0.3 | Kurtosis Detects | -2.148 |
| Mean of Logged Detects | -0.192 | SD of Logged Detects | 0.317 |
| | | | |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.818 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.225 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.283 | Detected Data appear Normal at 5% Significance Level | |
| **Detected Data appear Approximate Normal at 5% Significance Level** | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 0.863 | KM Standard Error of Mean | 0.0962 |
| KM SD | 0.255 | 95% KM (BCA) UCL | 1.013 |
| 95% KM (t) UCL | 1.037 | 95% KM (Percentile Bootstrap) UCL | 1.022 |
| 95% KM (z) UCL | 1.021 | 95% KM Bootstrap t UCL | 1.076 |
| 90% KM Chebyshev UCL | 1.151 | 95% KM Chebyshev UCL | 1.282 |
| 97.5% KM Chebyshev UCL | 1.464 | 99% KM Chebyshev UCL | 1.82 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.684 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.715 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.231 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.294 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| k hat (MLE) | 11.55 | k star (bias corrected MLE) | 7.304 |
| Theta hat (MLE) | 0.0747 | Theta star (bias corrected MLE) | 0.118 |
| nu hat (MLE) | 184.9 | nu star (bias corrected) | 116.9 |
| Mean (detects) | 0.863 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.6 | Mean | 0.86 |
| Maximum | 1.2 | Median | 0.845 |
| SD | 0.247 | CV | 0.287 |
| k hat (MLE) | 13.43 | k star (bias corrected MLE) | 9.826 |
| Theta hat (MLE) | 0.0641 | Theta star (bias corrected MLE) | 0.0875 |
| nu hat (MLE) | 295.4 | nu star (bias corrected) | 216.2 |
| Adjusted Level of Significance (β) | 0.0278 | | |
| Approximate Chi Square Value (216.16, α) | 183.1 | Adjusted Chi Square Value (216.16, β) | 178.2 |
| 95% Gamma Approximate UCL (use when n>=50) | 1.015 | 95% Gamma Adjusted UCL (use when n<50) | 1.044 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 0.863 | SD (KM) | 0.255 |
| Variance (KM) | 0.0648 | SE of Mean (KM) | 0.0962 |
| k hat (KM) | 11.47 | k star (KM) | 8.404 |
| nu hat (KM) | 252.4 | nu star (KM) | 184.9 |
| theta hat (KM) | 0.0752 | theta star (KM) | 0.103 |
| 80% gamma percentile (KM) | 1.098 | 90% gamma percentile (KM) | 1.259 |
| 95% gamma percentile (KM) | 1.403 | 99% gamma percentile (KM) | 1.701 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (184.89, α) | 154.4 | Adjusted Chi Square Value (184.89, β) | 149.9 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.033 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.064 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.819 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.818 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.218 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.283 | Detected Data appear Lognormal at 5% Significance Level | |
| Detected Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 0.857 | Mean in Log Scale | -0.192 |
| SD in Original Scale | 0.246 | SD in Log Scale | 0.287 |
| 95% t UCL (assumes normality of ROS data) | 0.991 | 95% Percentile Bootstrap UCL | 0.976 |
| 95% BCA Bootstrap UCL | 0.983 | 95% Bootstrap t UCL | 1.013 |
| 95% H-UCL (Log ROS) | 1.026 | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | -0.192 | KM Geo Mean | 0.825 |
| KM SD (logged) | 0.296 | 95% Critical H Value (KM-Log) | 1.945 |
| KM Standard Error of Mean (logged) | 0.112 | 95% H-UCL (KM -Log) | 1.035 |
| KM SD (logged) | 0.296 | 95% Critical H Value (KM-Log) | 1.945 |
| KM Standard Error of Mean (logged) | 0.112 | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 341.5 | Mean in Log Scale | 1.805 |
| SD in Original Scale | 583.5 | SD in Log Scale | 3.431 |
| 95% t UCL (Assumes normality) | 660.4 | 95% H-Stat UCL | 22198237 |
| **DL/2 is not a recommended method, provided for comparisons and historical reasons** | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Detected Data appear Approximate Normal Distributed at 5% Significance Level** | | | |
| **Suggested UCL to Use** | | | |
| 95% KM (t) UCL | 1.037 | | |
| When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test | | | |
| When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (pw \| downgradient estuarine \| 7440-47-3 \| tmet \| n/a \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 8 |
| Number of Detects | 7 | Number of Non-Detects | 4 |
| Number of Distinct Detects | 7 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 1.2 | Minimum Non-Detect | 5000 |
| Maximum Detect | 3.4 | Maximum Non-Detect | 5000 |
| Variance Detects | 0.748 | Percent Non-Detects | 36.36% |
| Mean Detects | 2.114 | SD Detects | 0.865 |
| Median Detects | 1.7 | CV Detects | 0.409 |
| Skewness Detects | 0.639 | Kurtosis Detects | -1.446 |
| Mean of Logged Detects | 0.679 | SD of Logged Detects | 0.402 |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.89 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.255 | **Lilliefors GOF Test** | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Normal at 5% Significance Level | |
| Detected Data appear Normal at 5% Significance Level | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 2.114 | KM Standard Error of Mean | 0.327 |
| KM SD | 0.801 | 95% KM (BCA) UCL | 2.65 |
| 95% KM (t) UCL | 2.707 | 95% KM (Percentile Bootstrap) UCL | 2.65 |
| 95% KM (z) UCL | 2.652 | 95% KM Bootstrap t UCL | 3.15 |
| 90% KM Chebyshev UCL | 3.095 | 95% KM Chebyshev UCL | 3.539 |
| 97.5% KM Chebyshev UCL | 4.156 | 99% KM Chebyshev UCL | 5.367 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.371 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.709 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.242 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.313 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 7.292 | k star (bias corrected MLE) | 4.262 |
| Theta hat (MLE) | 0.29 | Theta star (bias corrected MLE) | 0.496 |
| nu hat (MLE) | 102.1 | nu star (bias corrected) | 59.67 |
| Mean (detects) | 2.114 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 1.2 | Mean | 2.107 |
| Maximum | 3.4 | Median | 1.785 |
| SD | 0.789 | CV | 0.374 |
| k hat (MLE) | 8.035 | k star (bias corrected MLE) | 5.904 |
| Theta hat (MLE) | 0.262 | Theta star (bias corrected MLE) | 0.357 |
| nu hat (MLE) | 176.8 | nu star (bias corrected) | 129.9 |
| Adjusted Level of Significance (β) | 0.0278 | | |
| Approximate Chi Square Value (129.90, α) | 104.6 | Adjusted Chi Square Value (129.90, β) | 100.9 |
| 95% Gamma Approximate UCL (use when n>=50) | 2.617 | 95% Gamma Adjusted UCL (use when n<50) | 2.713 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 2.114 | SD (KM) | 0.801 |
| Variance (KM) | 0.641 | SE of Mean (KM) | 0.327 |
| k hat (KM) | 6.971 | k star (KM) | 5.131 |
| nu hat (KM) | 153.4 | nu star (KM) | 112.9 |
| theta hat (KM) | 0.303 | theta star (KM) | 0.412 |
| 80% gamma percentile (KM) | 2.834 | 90% gamma percentile (KM) | 3.364 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% gamma percentile (KM) | 3.846 | 99% gamma percentile (KM) | 4.864 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (112.88, α) | 89.35 | Adjusted Chi Square Value (112.88, β) | 85.94 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 2.671 | 95% Gamma Adjusted KM-UCL (use when n<50) | 2.777 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.925 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.215 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data appear Lognormal at 5% Significance Level | |
| Detected Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 2.097 | Mean in Log Scale | 0.679 |
| SD in Original Scale | 0.779 | SD in Log Scale | 0.367 |
| 95% t UCL (assumes normality of ROS data) | 2.523 | 95% Percentile Bootstrap UCL | 2.493 |
| 95% BCA Bootstrap UCL | 2.515 | 95% Bootstrap t UCL | 2.618 |
| 95% H-UCL (Log ROS) | 2.666 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | 0.679 | KM Geo Mean | 1.971 |
| KM SD (logged) | 0.372 | 95% Critical H Value (KM-Log) | 2.023 |
| KM Standard Error of Mean (logged) | 0.152 | 95% H-UCL (KM -Log) | 2.68 |
| KM SD (logged) | 0.372 | 95% Critical H Value (KM-Log) | 2.023 |
| KM Standard Error of Mean (logged) | 0.152 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 910.4 | Mean in Log Scale | 3.277 |
| SD in Original Scale | 1260 | SD in Log Scale | 3.618 |
| 95% t UCL (Assumes normality) | 1599 | 95% H-Stat UCL | 5.177E+8 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Detected Data appear Normal Distributed at 5% Significance Level | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% KM (t) UCL | 2.707 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (pw \| downgradient estuarine \| 7440-70-2 \| tmet \| n/a \| yes)** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 6 |
| | | Number of Missing Observations | 0 |
| Minimum | 290000 | Mean | 333636 |
| Maximum | 360000 | Median | 330000 |
| SD | 20136 | Std. Error of Mean | 6071 |
| Coefficient of Variation | 0.0604 | Skewness | -0.7 |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.929 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.158 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level | |
| Data appear Normal at 5% Significance Level | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 344640 | 95% Adjusted-CLT UCL (Chen-1995) | 342253 |
| | | 95% Modified-t UCL (Johnson-1978) | 344427 |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.364 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.726 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.161 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.254 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 293.7 | k star (bias corrected MLE) | 213.7 |
| Theta hat (MLE) | 1136 | Theta star (bias corrected MLE) | 1561 |
| nu hat (MLE) | 6462 | nu star (bias corrected) | 4701 |
| MLE Mean (bias corrected) | 333636 | MLE Sd (bias corrected) | 22824 |
| | | Approximate Chi Square Value (0.05) | 4543 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 4517 |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 345266 | 95% Adjusted Gamma UCL (use when n<50) | 347210 |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.917 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.168 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| **Lognormal Statistics** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 12.58 | Mean of logged Data | 12.72 |
| Maximum of Logged Data | 12.79 | SD of logged Data | 0.0617 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | N/A | 90% Chebyshev (MVUE) UCL | 352264 |
| 95% Chebyshev (MVUE) UCL | 360697 | 97.5% Chebyshev (MVUE) UCL | 372403 |
| 99% Chebyshev (MVUE) UCL | 395396 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 343623 | 95% Jackknife UCL | 344640 |
| 95% Standard Bootstrap UCL | 343346 | 95% Bootstrap-t UCL | 343333 |
| 95% Hall's Bootstrap UCL | 343040 | 95% Percentile Bootstrap UCL | 342727 |
| 95% BCA Bootstrap UCL | 340909 | | |
| 90% Chebyshev(Mean, Sd) UCL | 351850 | 95% Chebyshev(Mean, Sd) UCL | 360100 |
| 97.5% Chebyshev(Mean, Sd) UCL | 371551 | 99% Chebyshev(Mean, Sd) UCL | 394044 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 344640 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be** | | | |
| **reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.** | | | |
| | | | |
| **Conc (pw \| downgradient estuarine \| 75-15-0 \| voc \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 5 |
| Number of Detects | 4 | Number of Non-Detects | 7 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 1.8 | Minimum Non-Detect | 0.8 |
| Maximum Detect | 23 | Maximum Non-Detect | 0.8 |
| Variance Detects | 105.3 | Percent Non-Detects | 63.64% |
| Mean Detects | 7.675 | SD Detects | 10.26 |
| Median Detects | 2.95 | CV Detects | 1.337 |
| Skewness Detects | 1.95 | Kurtosis Detects | 3.82 |
| Mean of Logged Detects | 1.444 | SD of Logged Detects | 1.178 |
| | | | |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.702 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data Not Normal at 5% Significance Level | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Lilliefors Test Statistic | 0.394 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.375 | Detected Data Not Normal at 5% Significance Level | |
| Detected Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 3.3 | KM Standard Error of Mean | 2.192 |
| KM SD | 6.297 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 7.273 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 6.906 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 9.877 | 95% KM Chebyshev UCL | 12.86 |
| 97.5% KM Chebyshev UCL | 16.99 | 99% KM Chebyshev UCL | 25.11 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.586 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.667 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.347 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.403 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 0.975 | k star (bias corrected MLE) | 0.41 |
| Theta hat (MLE) | 7.87 | Theta star (bias corrected MLE) | 18.7 |
| nu hat (MLE) | 7.802 | nu star (bias corrected) | 3.284 |
| Mean (detects) | 7.675 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.01 | Mean | 2.797 |
| Maximum | 23 | Median | 0.01 |
| SD | 6.822 | CV | 2.439 |
| k hat (MLE) | 0.212 | k star (bias corrected MLE) | 0.215 |
| Theta hat (MLE) | 13.18 | Theta star (bias corrected MLE) | 13.01 |
| nu hat (MLE) | 4.671 | nu star (bias corrected) | 4.73 |
| Adjusted Level of Significance (β) | 0.0278 | | |
| Approximate Chi Square Value (4.73, α) | 1.03 | Adjusted Chi Square Value (4.73, β) | 0.781 |
| 95% Gamma Approximate UCL (use when n>=50) | 12.85 | 95% Gamma Adjusted UCL (use when n<50) | N/A |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 3.3 | SD (KM) | 6.297 |
| Variance (KM) | 39.65 | SE of Mean (KM) | 2.192 |
| k hat (KM) | 0.275 | k star (KM) | 0.26 |
| nu hat (KM) | 6.043 | nu star (KM) | 5.728 |
| theta hat (KM) | 12.01 | theta star (KM) | 12.67 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 80% gamma percentile (KM) | 4.86 | 90% gamma percentile (KM) | 9.874 |
| 95% gamma percentile (KM) | 15.78 | 99% gamma percentile (KM) | 31.41 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (5.73, α) | 1.502 | Adjusted Chi Square Value (5.73, β) | 1.18 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 12.58 | 95% Gamma Adjusted KM-UCL (use when n<50) | 16.02 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.833 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.748 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.278 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.375 | Detected Data appear Lognormal at 5% Significance Level | |
| **Detected Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 2.87 | Mean in Log Scale | -1.312 |
| SD in Original Scale | 6.79 | SD in Log Scale | 2.584 |
| 95% t UCL (assumes normality of ROS data) | 6.581 | 95% Percentile Bootstrap UCL | 6.816 |
| 95% BCA Bootstrap UCL | 8.829 | 95% Bootstrap t UCL | 25.25 |
| 95% H-UCL (Log ROS) | 1550 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | 0.383 | KM Geo Mean | 1.467 |
| KM SD (logged) | 1.011 | 95% Critical H Value (KM-Log) | 3.019 |
| KM Standard Error of Mean (logged) | 0.352 | 95% H-UCL (KM -Log) | 6.42 |
| KM SD (logged) | 1.011 | 95% Critical H Value (KM-Log) | 3.019 |
| KM Standard Error of Mean (logged) | 0.352 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 3.045 | Mean in Log Scale | -0.0579 |
| SD in Original Scale | 6.712 | SD in Log Scale | 1.355 |
| 95% t UCL (Assumes normality) | 6.714 | 95% H-Stat UCL | 11.62 |
| **DL/2 is not a recommended method, provided for comparisons and historical reasons** | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Detected Data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% KM Bootstrap t UCL | N/A | Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) | 16.02 |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 117-81-7 \| svoc \| n/a \| yes)** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| General Statistics | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 11 |
| Number of Detects | 2 | Number of Non-Detects | 17 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 9 |
| Minimum Detect | 4.36 | Minimum Non-Detect | 1.2000E-4 |
| Maximum Detect | 162 | Maximum Non-Detect | 5.7000E-4 |
| Variance Detects | 12425 | Percent Non-Detects | 89.47% |
| Mean Detects | 83.18 | SD Detects | 111.5 |
| Median Detects | 83.18 | CV Detects | 1.34 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 3.28 | SD of Logged Detects | 2.556 |

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

**Normal GOF Test on Detects Only**

Not Enough Data to Perform GOF Test

| Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs | | | |
|---|---|---|---|
| KM Mean | 8.756 | KM Standard Error of Mean | 11.72 |
| KM SD | 36.13 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 29.08 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 28.04 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 43.93 | 95% KM Chebyshev UCL | 59.86 |
| 97.5% KM Chebyshev UCL | 81.97 | 99% KM Chebyshev UCL | 125.4 |

**Gamma GOF Tests on Detected Observations Only**

Not Enough Data to Perform GOF Test

| Gamma Statistics on Detected Data Only | | | |
|---|---|---|---|
| k hat (MLE) | 0.549 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 151.6 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 2.195 | nu star (bias corrected) | N/A |
| Mean (detects) | 83.18 | | |

| Estimates of Gamma Parameters using KM Estimates | | | |
|---|---|---|---|
| Mean (KM) | 8.756 | SD (KM) | 36.13 |
| Variance (KM) | 1306 | SE of Mean (KM) | 11.72 |
| k hat (KM) | 0.0587 | k star (KM) | 0.0845 |
| nu hat (KM) | 2.231 | nu star (KM) | 3.212 |
| theta hat (KM) | 149.1 | theta star (KM) | 103.6 |
| 80% gamma percentile (KM) | 4.623 | 90% gamma percentile (KM) | 21.46 |
| 95% gamma percentile (KM) | 51 | 99% gamma percentile (KM) | 151 |

**Gamma Kaplan-Meier (KM) Statistics**

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| | | Adjusted Level of Significance (β) | 0.0369 |
| Approximate Chi Square Value (3.21, α) | 0.438 | Adjusted Chi Square Value (3.21, β) | 0.364 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 64.21 | 95% Gamma Adjusted KM-UCL (use when n<50) | 77.19 |
| 95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50) | | | |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Not Enough Data to Perform GOF Test | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 8.756 | Mean in Log Scale | -13.92 |
| SD in Original Scale | 37.12 | SD in Log Scale | 7.539 |
| 95% t UCL (assumes normality of ROS data) | 23.52 | 95% Percentile Bootstrap UCL | 25.81 |
| 95% BCA Bootstrap UCL | 42.63 | 95% Bootstrap t UCL | 2054148 |
| 95% H-UCL (Log ROS) | 4.873E+17 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | -7.732 | KM Geo Mean | 4.3838E-4 |
| KM SD (logged) | 3.823 | 95% Critical H Value (KM-Log) | 7.483 |
| KM Standard Error of Mean (logged) | 1.24 | 95% H-UCL (KM -Log) | 552.7 |
| KM SD (logged) | 3.823 | 95% Critical H Value (KM-Log) | 7.483 |
| KM Standard Error of Mean (logged) | 1.24 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 8.756 | Mean in Log Scale | -7.444 |
| SD in Original Scale | 37.12 | SD in Log Scale | 3.866 |
| 95% t UCL (Assumes normality) | 23.52 | 95% H-Stat UCL | 987.2 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 99% KM (Chebyshev) UCL | 125.4 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 67-64-1 \| voc \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 16 |
| Number of Detects | 15 | Number of Non-Detects | 4 |
| Number of Distinct Detects | 12 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.028 | Minimum Non-Detect | 1.8000E-5 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Maximum Detect | 0.33 | Maximum Non-Detect | 4.4000E-5 |
| Variance Detects | 0.00712 | Percent Non-Detects | 21.05% |
| Mean Detects | 0.14 | SD Detects | 0.0844 |
| Median Detects | 0.12 | CV Detects | 0.601 |
| Skewness Detects | 0.778 | Kurtosis Detects | 0.626 |
| Mean of Logged Detects | -2.172 | SD of Logged Detects | 0.732 |
| | | | |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.927 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.163 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.22 | Detected Data appear Normal at 5% Significance Level | |
| **Detected Data appear Normal at 5% Significance Level** | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 0.111 | KM Standard Error of Mean | 0.0219 |
| KM SD | 0.0923 | 95% KM (BCA) UCL | 0.145 |
| 95% KM (t) UCL | 0.149 | 95% KM (Percentile Bootstrap) UCL | 0.146 |
| 95% KM (z) UCL | 0.147 | 95% KM Bootstrap t UCL | 0.153 |
| 90% KM Chebyshev UCL | 0.177 | 95% KM Chebyshev UCL | 0.206 |
| 97.5% KM Chebyshev UCL | 0.248 | 99% KM Chebyshev UCL | 0.329 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.478 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.746 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.17 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.224 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 2.551 | k star (bias corrected MLE) | 2.086 |
| Theta hat (MLE) | 0.055 | Theta star (bias corrected MLE) | 0.0673 |
| nu hat (MLE) | 76.54 | nu star (bias corrected) | 62.57 |
| Mean (detects) | 0.14 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.01 | Mean | 0.113 |
| Maximum | 0.33 | Median | 0.12 |
| SD | 0.0923 | CV | 0.817 |
| k hat (MLE) | 1.131 | k star (bias corrected MLE) | 0.988 |
| Theta hat (MLE) | 0.0998 | Theta star (bias corrected MLE) | 0.114 |
| nu hat (MLE) | 42.98 | nu star (bias corrected) | 37.53 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Adjusted Level of Significance (β) | 0.0369 | | |
| Approximate Chi Square Value (37.53, α) | 24.5 | Adjusted Chi Square Value (37.53, β) | 23.58 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.173 | 95% Gamma Adjusted UCL (use when n<50) | 0.18 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 0.111 | SD (KM) | 0.0923 |
| Variance (KM) | 0.00852 | SE of Mean (KM) | 0.0219 |
| k hat (KM) | 1.442 | k star (KM) | 1.249 |
| nu hat (KM) | 54.78 | nu star (KM) | 47.46 |
| theta hat (KM) | 0.0769 | theta star (KM) | 0.0887 |
| 80% gamma percentile (KM) | 0.175 | 90% gamma percentile (KM) | 0.242 |
| 95% gamma percentile (KM) | 0.307 | 99% gamma percentile (KM) | 0.457 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (47.46, α) | 32.65 | Adjusted Chi Square Value (47.46, β) | 31.58 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.161 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.167 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.898 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.881 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.214 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.22 | Detected Data appear Lognormal at 5% Significance Level | |
| Detected Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 0.116 | Mean in Log Scale | -2.505 |
| SD in Original Scale | 0.0891 | SD in Log Scale | 0.925 |
| 95% t UCL (assumes normality of ROS data) | 0.151 | 95% Percentile Bootstrap UCL | 0.15 |
| 95% BCA Bootstrap UCL | 0.153 | 95% Bootstrap t UCL | 0.162 |
| 95% H-UCL (Log ROS) | 0.216 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | -4.015 | KM Geo Mean | 0.018 |
| KM SD (logged) | 3.623 | 95% Critical H Value (KM-Log) | 7.207 |
| KM Standard Error of Mean (logged) | 0.86 | 95% H-UCL (KM -Log) | 6028 |
| KM SD (logged) | 3.623 | 95% Critical H Value (KM-Log) | 7.207 |
| KM Standard Error of Mean (logged) | 0.86 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 0.111 | Mean in Log Scale | -4.098 |
| SD in Original Scale | 0.0948 | SD in Log Scale | 3.889 |
| 95% t UCL (Assumes normality) | 0.149 | 95% H-Stat UCL | 32860 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Detected Data appear Normal Distributed at 5% Significance Level | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Suggested UCL to Use** | | | |
| 95% KM (t) UCL | 0.149 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (sd \| downgradient estuarine \| 7429-90-5 \| tmet \| n/a \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 16 |
| | | Number of Missing Observations | 0 |
| Minimum | 12200 | Mean | 18905 |
| Maximum | 28000 | Median | 18500 |
| SD | 3737 | Std. Error of Mean | 857.3 |
| Coefficient of Variation | 0.198 | Skewness | 0.313 |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.963 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.129 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level | |
| **Data appear Normal at 5% Significance Level** | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 20392 | 95% Adjusted-CLT UCL (Chen-1995) | 20381 |
| | | 95% Modified-t UCL (Johnson-1978) | 20402 |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.294 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.74 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.121 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.198 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 26.62 | k star (bias corrected MLE) | 22.45 |
| Theta hat (MLE) | 710.3 | Theta star (bias corrected MLE) | 842.2 |
| nu hat (MLE) | 1011 | nu star (bias corrected) | 853 |
| MLE Mean (bias corrected) | 18905 | MLE Sd (bias corrected) | 3990 |
| | | Approximate Chi Square Value (0.05) | 786.2 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 780.6 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 20511 | 95% Adjusted Gamma UCL (use when n<50) | 20658 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.963 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.128 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 9.409 | Mean of logged Data | 9.828 |
| Maximum of Logged Data | 10.24 | SD of logged Data | 0.202 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 20608 | 90% Chebyshev (MVUE) UCL | 21555 |
| 95% Chebyshev (MVUE) UCL | 22753 | 97.5% Chebyshev (MVUE) UCL | 24414 |
| 99% Chebyshev (MVUE) UCL | 27679 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 20315 | 95% Jackknife UCL | 20392 |
| 95% Standard Bootstrap UCL | 20278 | 95% Bootstrap-t UCL | 20546 |
| 95% Hall's Bootstrap UCL | 20479 | 95% Percentile Bootstrap UCL | 20316 |
| 95% BCA Bootstrap UCL | 20205 | | |
| 90% Chebyshev(Mean, Sd) UCL | 21477 | 95% Chebyshev(Mean, Sd) UCL | 22642 |
| 97.5% Chebyshev(Mean, Sd) UCL | 24259 | 99% Chebyshev(Mean, Sd) UCL | 27435 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 20392 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 7439-89-6 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 16 |
| | | Number of Missing Observations | 0 |
| Minimum | 11500 | Mean | 22874 |
| Maximum | 34000 | Median | 25000 |
| SD | 6180 | Std. Error of Mean | 1418 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Coefficient of Variation | 0.27 | Skewness | -0.361 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.957 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.161 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level | |
| **Data appear Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 25332 | 95% Adjusted-CLT UCL (Chen-1995) | 25080 |
| | | 95% Modified-t UCL (Johnson-1978) | 25313 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.643 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.187 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.198 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 12.63 | k star (bias corrected MLE) | 10.67 |
| Theta hat (MLE) | 1812 | Theta star (bias corrected MLE) | 2144 |
| nu hat (MLE) | 479.8 | nu star (bias corrected) | 405.4 |
| MLE Mean (bias corrected) | 22874 | MLE Sd (bias corrected) | 7003 |
| | | Approximate Chi Square Value (0.05) | 359.7 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 356 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 25778 | 95% Adjusted Gamma UCL (use when n<50) | 26050 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.911 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.191 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 9.35 | Mean of logged Data | 9.998 |
| Maximum of Logged Data | 10.43 | SD of logged Data | 0.303 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 26257 | 90% Chebyshev (MVUE) UCL | 27808 |
| 95% Chebyshev (MVUE) UCL | 30008 | 97.5% Chebyshev (MVUE) UCL | 33062 |
| 99% Chebyshev (MVUE) UCL | 39060 | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 25206 | 95% Jackknife UCL | 25332 |
| 95% Standard Bootstrap UCL | 25143 | 95% Bootstrap-t UCL | 25251 |
| 95% Hall's Bootstrap UCL | 25059 | 95% Percentile Bootstrap UCL | 25021 |
| 95% BCA Bootstrap UCL | 24979 | | |
| 90% Chebyshev(Mean, Sd) UCL | 27127 | 95% Chebyshev(Mean, Sd) UCL | 29054 |
| 97.5% Chebyshev(Mean, Sd) UCL | 31728 | 99% Chebyshev(Mean, Sd) UCL | 36981 |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 25332 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be** | | | |
| **reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.** | | | |
| **Conc (sd \| downgradient estuarine \| 7439-92-1 \| tmet \| n/a \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 17 |
| | | Number of Missing Observations | 0 |
| Minimum | 8.9 | Mean | 19.25 |
| Maximum | 45.3 | Median | 18 |
| SD | 7.322 | Std. Error of Mean | 1.68 |
| Coefficient of Variation | 0.38 | Skewness | 2.558 |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.745 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.233 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Normal at 5% Significance Level | |
| **Data Not Normal at 5% Significance Level** | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 22.17 | 95% Adjusted-CLT UCL (Chen-1995) | 23.07 |
| | | 95% Modified-t UCL (Johnson-1978) | 22.33 |
| **Gamma GOF Test** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.774 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.741 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.179 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.199 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data follow Appr. Gamma Distribution at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 9.667 | k star (bias corrected MLE) | 8.176 |
| Theta hat (MLE) | 1.992 | Theta star (bias corrected MLE) | 2.355 |
| nu hat (MLE) | 367.4 | nu star (bias corrected) | 310.7 |
| MLE Mean (bias corrected) | 19.25 | MLE Sd (bias corrected) | 6.733 |
| | | Approximate Chi Square Value (0.05) | 270.9 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 267.6 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 22.08 | 95% Adjusted Gamma UCL (use when n<50) | 22.35 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.911 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.167 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.186 | Mean of logged Data | 2.905 |
| Maximum of Logged Data | 3.813 | SD of logged Data | 0.32 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 22.12 | 90% Chebyshev (MVUE) UCL | 23.46 |
| 95% Chebyshev (MVUE) UCL | 25.4 | 97.5% Chebyshev (MVUE) UCL | 28.1 |
| 99% Chebyshev (MVUE) UCL | 33.4 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 22.02 | 95% Jackknife UCL | 22.17 |
| 95% Standard Bootstrap UCL | 21.94 | 95% Bootstrap-t UCL | 23.79 |
| 95% Hall's Bootstrap UCL | 35.67 | 95% Percentile Bootstrap UCL | 22.16 |
| 95% BCA Bootstrap UCL | 23.22 | | |
| 90% Chebyshev(Mean, Sd) UCL | 24.29 | 95% Chebyshev(Mean, Sd) UCL | 26.57 |
| 97.5% Chebyshev(Mean, Sd) UCL | 29.74 | 99% Chebyshev(Mean, Sd) UCL | 35.97 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 22.35 | | |

**Attachment C**
**ProUCL 5.1 Output**

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Conc (sd | downgradient estuarine | 7440-02-0 | tmet | n/a | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 16 |
| | | Number of Missing Observations | 0 |
| Minimum | 8.3 | Mean | 17.95 |
| Maximum | 26 | Median | 17.1 |
| SD | 4.021 | Std. Error of Mean | 0.922 |
| Coefficient of Variation | 0.224 | Skewness | -0.433 |

**Normal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.962 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.167 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level |

**Data appear Normal at 5% Significance Level**

**Assuming Normal Distribution**

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 19.55 | 95% Adjusted-CLT UCL (Chen-1995) | 19.37 |
| | | 95% Modified-t UCL (Johnson-1978) | 19.54 |

**Gamma GOF Test**

| | | |
|---|---|---|
| A-D Test Statistic | 0.562 | **Anderson-Darling Gamma GOF Test** |
| 5% A-D Critical Value | 0.74 | Detected data appear Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.2 | **Kolmogorov-Smirnov Gamma GOF Test** |
| 5% K-S Critical Value | 0.198 | Data Not Gamma Distributed at 5% Significance Level |

**Detected data follow Appr. Gamma Distribution at 5% Significance Level**

**Gamma Statistics**

| | | | |
|---|---|---|---|
| k hat (MLE) | 18.12 | k star (bias corrected MLE) | 15.29 |
| Theta hat (MLE) | 0.991 | Theta star (bias corrected MLE) | 1.174 |
| nu hat (MLE) | 688.4 | nu star (bias corrected) | 581.1 |
| MLE Mean (bias corrected) | 17.95 | MLE Sd (bias corrected) | 4.591 |
| | | Approximate Chi Square Value (0.05) | 526.2 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 521.6 |

**Assuming Gamma Distribution**

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 19.83 | 95% Adjusted Gamma UCL (use when n<50) | 20 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.892 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.22 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.116 | Mean of logged Data | 2.86 |
| Maximum of Logged Data | 3.258 | SD of logged Data | 0.255 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 20.11 | 90% Chebyshev (MVUE) UCL | 21.19 |
| 95% Chebyshev (MVUE) UCL | 22.64 | 97.5% Chebyshev (MVUE) UCL | 24.64 |
| 99% Chebyshev (MVUE) UCL | 28.58 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 19.47 | 95% Jackknife UCL | 19.55 |
| 95% Standard Bootstrap UCL | 19.42 | 95% Bootstrap-t UCL | 19.39 |
| 95% Hall's Bootstrap UCL | 19.39 | 95% Percentile Bootstrap UCL | 19.41 |
| 95% BCA Bootstrap UCL | 19.33 | | |
| 90% Chebyshev(Mean, Sd) UCL | 20.72 | 95% Chebyshev(Mean, Sd) UCL | 21.97 |
| 97.5% Chebyshev(Mean, Sd) UCL | 23.71 | 99% Chebyshev(Mean, Sd) UCL | 27.13 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 19.55 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be** | | | |
| **reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.** | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 7440-38-2 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 15 |
| | | Number of Missing Observations | 0 |
| Minimum | 4 | Mean | 10.36 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Maximum | 21.3 | Median | 8.5 |
| SD | 5.122 | Std. Error of Mean | 1.175 |
| Coefficient of Variation | 0.495 | Skewness | 1.107 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.835 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.289 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 12.4 | 95% Adjusted-CLT UCL (Chen-1995) | 12.61 |
| | | 95% Modified-t UCL (Johnson-1978) | 12.45 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.973 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.743 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.245 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.199 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 4.94 | k star (bias corrected MLE) | 4.195 |
| Theta hat (MLE) | 2.097 | Theta star (bias corrected MLE) | 2.469 |
| nu hat (MLE) | 187.7 | nu star (bias corrected) | 159.4 |
| MLE Mean (bias corrected) | 10.36 | MLE Sd (bias corrected) | 5.057 |
| | | Approximate Chi Square Value (0.05) | 131.2 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 129 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 12.58 | 95% Adjusted Gamma UCL (use when n<50) | 12.8 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.92 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.215 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Lognormal at 5% Significance Level | |
| Data appear Approximate Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.386 | Mean of logged Data | 2.233 |
| Maximum of Logged Data | 3.059 | SD of logged Data | 0.463 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 12.88 | 90% Chebyshev (MVUE) UCL | 13.71 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% Chebyshev (MVUE) UCL | 15.25 | 97.5% Chebyshev (MVUE) UCL | 17.38 |
| 99% Chebyshev (MVUE) UCL | 21.57 | | |

**Nonparametric Distribution Free UCL Statistics**

Data appear to follow a Discernible Distribution at 5% Significance Level

**Nonparametric Distribution Free UCLs**

| | | | |
|---|---|---|---|
| 95% CLT UCL | 12.29 | 95% Jackknife UCL | 12.4 |
| 95% Standard Bootstrap UCL | 12.19 | 95% Bootstrap-t UCL | 13.03 |
| 95% Hall's Bootstrap UCL | 12.32 | 95% Percentile Bootstrap UCL | 12.35 |
| 95% BCA Bootstrap UCL | 12.56 | | |
| 90% Chebyshev(Mean, Sd) UCL | 13.88 | 95% Chebyshev(Mean, Sd) UCL | 15.48 |
| 97.5% Chebyshev(Mean, Sd) UCL | 17.7 | 99% Chebyshev(Mean, Sd) UCL | 22.05 |

**Suggested UCL to Use**

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 12.4 | or 95% Modified-t UCL | 12.45 |
| or 95% H-UCL | 12.88 | | |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ProUCL computes and outputs H-statistic based UCLs for historical reasons only.

H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.

It is therefore recommended to avoid the use of H-statistic based 95% UCLs.

Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.

**Conc (sd | downgradient estuarine | 7440-39-3 | tmet | n/a | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 15 |
| | | Number of Missing Observations | 0 |
| Minimum | 24.8 | Mean | 40.35 |
| Maximum | 62 | Median | 40 |
| SD | 8.268 | Std. Error of Mean | 1.897 |
| Coefficient of Variation | 0.205 | Skewness | 0.512 |

**Normal GOF Test**

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.949 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.125 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level | |

Data appear Normal at 5% Significance Level

**Assuming Normal Distribution**

**Attachment C**
**ProUCL 5.1 Output**

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 43.64 | 95% Adjusted-CLT UCL (Chen-1995) | 43.71 |
| | | 95% Modified-t UCL (Johnson-1978) | 43.67 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.392 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.74 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.143 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.198 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 25.14 | k star (bias corrected MLE) | 21.2 |
| Theta hat (MLE) | 1.605 | Theta star (bias corrected MLE) | 1.903 |
| nu hat (MLE) | 955.2 | nu star (bias corrected) | 805.7 |
| MLE Mean (bias corrected) | 40.35 | MLE Sd (bias corrected) | 8.762 |
| | | Approximate Chi Square Value (0.05) | 740.9 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 735.4 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 43.88 | 95% Adjusted Gamma UCL (use when n<50) | 44.2 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.961 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.157 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 3.211 | Mean of logged Data | 3.678 |
| Maximum of Logged Data | 4.127 | SD of logged Data | 0.207 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 44.09 | 90% Chebyshev (MVUE) UCL | 46.15 |
| 95% Chebyshev (MVUE) UCL | 48.78 | 97.5% Chebyshev (MVUE) UCL | 52.42 |
| 99% Chebyshev (MVUE) UCL | 59.57 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 43.47 | 95% Jackknife UCL | 43.64 |
| 95% Standard Bootstrap UCL | 43.44 | 95% Bootstrap-t UCL | 43.84 |
| 95% Hall's Bootstrap UCL | 44.49 | 95% Percentile Bootstrap UCL | 43.51 |
| 95% BCA Bootstrap UCL | 43.54 | | |
| 90% Chebyshev(Mean, Sd) UCL | 46.04 | 95% Chebyshev(Mean, Sd) UCL | 48.62 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 97.5% Chebyshev(Mean, Sd) UCL | 52.19 | 99% Chebyshev(Mean, Sd) UCL | 59.22 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 43.64 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 7440-47-3 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 16 |
| | | Number of Missing Observations | 0 |
| Minimum | 16.4 | Mean | 38.66 |
| Maximum | 59 | Median | 38 |
| SD | 9.851 | Std. Error of Mean | 2.26 |
| Coefficient of Variation | 0.255 | Skewness | -0.28 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.982 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.117 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level | |
| **Data appear Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 42.58 | 95% Adjusted-CLT UCL (Chen-1995) | 42.22 |
| | | 95% Modified-t UCL (Johnson-1978) | 42.55 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.398 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.741 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.155 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.198 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 13.95 | k star (bias corrected MLE) | 11.79 |
| Theta hat (MLE) | 2.77 | Theta star (bias corrected MLE) | 3.28 |
| nu hat (MLE) | 530.3 | nu star (bias corrected) | 447.9 |
| MLE Mean (bias corrected) | 38.66 | MLE Sd (bias corrected) | 11.26 |
| | | Approximate Chi Square Value (0.05) | 399.8 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 395.9 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 43.31 | 95% Adjusted Gamma UCL (use when n<50) | 43.74 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.914 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.174 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.797 | Mean of logged Data | 3.618 |
| Maximum of Logged Data | 4.078 | SD of logged Data | 0.292 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 44.14 | 90% Chebyshev (MVUE) UCL | 46.7 |
| 95% Chebyshev (MVUE) UCL | 50.28 | 97.5% Chebyshev (MVUE) UCL | 55.24 |
| 99% Chebyshev (MVUE) UCL | 64.98 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 42.38 | 95% Jackknife UCL | 42.58 |
| 95% Standard Bootstrap UCL | 42.2 | 95% Bootstrap-t UCL | 42.48 |
| 95% Hall's Bootstrap UCL | 42.46 | 95% Percentile Bootstrap UCL | 42.25 |
| 95% BCA Bootstrap UCL | 42.05 | | |
| 90% Chebyshev(Mean, Sd) UCL | 45.44 | 95% Chebyshev(Mean, Sd) UCL | 48.51 |
| 97.5% Chebyshev(Mean, Sd) UCL | 52.77 | 99% Chebyshev(Mean, Sd) UCL | 61.14 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 42.58 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be** | | | |
| **reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.** | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 7440-50-8 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 12 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| | | Number of Missing Observations | 0 |
| Minimum | 8.8 | Mean | 15.65 |
| Maximum | 21.9 | Median | 15 |
| SD | 3.393 | Std. Error of Mean | 0.778 |
| Coefficient of Variation | 0.217 | Skewness | -0.145 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.981 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.124 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Normal at 5% Significance Level | |
| **Data appear Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 17 | 95% Adjusted-CLT UCL (Chen-1995) | 16.9 |
| | | 95% Modified-t UCL (Johnson-1978) | 16.99 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.283 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.74 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.135 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.198 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 20.92 | k star (bias corrected MLE) | 17.65 |
| Theta hat (MLE) | 0.748 | Theta star (bias corrected MLE) | 0.887 |
| nu hat (MLE) | 794.8 | nu star (bias corrected) | 670.7 |
| MLE Mean (bias corrected) | 15.65 | MLE Sd (bias corrected) | 3.725 |
| | | Approximate Chi Square Value (0.05) | 611.6 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 606.7 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 17.16 | 95% Adjusted Gamma UCL (use when n<50) | 17.3 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.958 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.142 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.175 | Mean of logged Data | 2.726 |
| Maximum of Logged Data | 3.086 | SD of logged Data | 0.231 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 17.3 | 90% Chebyshev (MVUE) UCL | 18.18 |
| 95% Chebyshev (MVUE) UCL | 19.31 | 97.5% Chebyshev (MVUE) UCL | 20.89 |
| 99% Chebyshev (MVUE) UCL | 23.99 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 16.93 | 95% Jackknife UCL | 17 |
| 95% Standard Bootstrap UCL | 16.87 | 95% Bootstrap-t UCL | 16.84 |
| 95% Hall's Bootstrap UCL | 16.99 | 95% Percentile Bootstrap UCL | 16.86 |
| 95% BCA Bootstrap UCL | 16.82 | | |
| 90% Chebyshev(Mean, Sd) UCL | 17.98 | 95% Chebyshev(Mean, Sd) UCL | 19.04 |
| 97.5% Chebyshev(Mean, Sd) UCL | 20.51 | 99% Chebyshev(Mean, Sd) UCL | 23.39 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 17 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be | | | |
| reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets. | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| 7440-62-2 \| tmet \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 15 |
| | | Number of Missing Observations | 0 |
| Minimum | 23.9 | Mean | 47.58 |
| Maximum | 77 | Median | 50 |
| SD | 11.03 | Std. Error of Mean | 2.529 |
| Coefficient of Variation | 0.232 | Skewness | 0.169 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.867 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.228 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% Student's-t UCL | 51.97 | 95% Adjusted-CLT UCL (Chen-1995) | 51.84 |
| | | 95% Modified-t UCL (Johnson-1978) | 51.98 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 1.293 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.74 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.213 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.198 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 17.91 | k star (bias corrected MLE) | 15.12 |
| Theta hat (MLE) | 2.657 | Theta star (bias corrected MLE) | 3.148 |
| nu hat (MLE) | 680.5 | nu star (bias corrected) | 574.4 |
| MLE Mean (bias corrected) | 47.58 | MLE Sd (bias corrected) | 12.24 |
| | | Approximate Chi Square Value (0.05) | 519.8 |
| Adjusted Level of Significance | 0.0369 | Adjusted Chi Square Value | 515.3 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 52.58 | 95% Adjusted Gamma UCL (use when n<50) | 53.04 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.838 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.901 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.221 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.197 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 3.174 | Mean of logged Data | 3.834 |
| Maximum of Logged Data | 4.344 | SD of logged Data | 0.254 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 53.24 | 90% Chebyshev (MVUE) UCL | 56.09 |
| 95% Chebyshev (MVUE) UCL | 59.89 | 97.5% Chebyshev (MVUE) UCL | 65.17 |
| 99% Chebyshev (MVUE) UCL | 75.55 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 51.74 | 95% Jackknife UCL | 51.97 |
| 95% Standard Bootstrap UCL | 51.52 | 95% Bootstrap-t UCL | 51.82 |
| 95% Hall's Bootstrap UCL | 52.71 | 95% Percentile Bootstrap UCL | 51.6 |
| 95% BCA Bootstrap UCL | 51.59 | | |
| 90% Chebyshev(Mean, Sd) UCL | 55.17 | 95% Chebyshev(Mean, Sd) UCL | 58.6 |
| 97.5% Chebyshev(Mean, Sd) UCL | 63.37 | 99% Chebyshev(Mean, Sd) UCL | 72.75 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 51.97 | or 95% Modified-t UCL | 51.98 |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (sd \| downgradient estuarine \| 75-15-0 \| voc \| n/a \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 19 | Number of Distinct Observations | 19 |
| Number of Detects | 16 | Number of Non-Detects | 3 |
| Number of Distinct Detects | 16 | Number of Distinct Non-Detects | 3 |
| Minimum Detect | 0.0084 | Minimum Non-Detect | 4.4000E-6 |
| Maximum Detect | 0.18 | Maximum Non-Detect | 2.3000E-5 |
| Variance Detects | 0.00185 | Percent Non-Detects | 15.79% |
| Mean Detects | 0.0429 | SD Detects | 0.043 |
| Median Detects | 0.0304 | CV Detects | 1.002 |
| Skewness Detects | 2.333 | Kurtosis Detects | 6.819 |
| Mean of Logged Detects | -3.537 | SD of Logged Detects | 0.914 |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.742 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.211 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.213 | Detected Data appear Normal at 5% Significance Level | |
| **Detected Data appear Approximate Normal at 5% Significance Level** | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 0.0361 | KM Standard Error of Mean | 0.00978 |
| KM SD | 0.0413 | 95% KM (BCA) UCL | 0.0527 |
| 95% KM (t) UCL | 0.0531 | 95% KM (Percentile Bootstrap) UCL | 0.0527 |
| 95% KM (z) UCL | 0.0522 | 95% KM Bootstrap t UCL | 0.064 |
| 90% KM Chebyshev UCL | 0.0655 | 95% KM Chebyshev UCL | 0.0788 |
| 97.5% KM Chebyshev UCL | 0.0972 | 99% KM Chebyshev UCL | 0.133 |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.423 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.756 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.143 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.219 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 1.431 | k star (bias corrected MLE) | 1.205 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Theta hat (MLE) | 0.03 | Theta star (bias corrected MLE) | 0.0356 |
| nu hat (MLE) | 45.8 | nu star (bias corrected) | 38.55 |
| Mean (detects) | 0.0429 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.0084 | Mean | 0.0377 |
| Maximum | 0.18 | Median | 0.026 |
| SD | 0.0411 | CV | 1.091 |
| k hat (MLE) | 1.31 | k star (bias corrected MLE) | 1.138 |
| Theta hat (MLE) | 0.0288 | Theta star (bias corrected MLE) | 0.0331 |
| nu hat (MLE) | 49.78 | nu star (bias corrected) | 43.25 |
| Adjusted Level of Significance (β) | 0.0369 | | |
| Approximate Chi Square Value (43.25, α) | 29.17 | Adjusted Chi Square Value (43.25, β) | 28.16 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.0559 | 95% Gamma Adjusted UCL (use when n<50) | 0.0579 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 0.0361 | SD (KM) | 0.0413 |
| Variance (KM) | 0.0017 | SE of Mean (KM) | 0.00978 |
| k hat (KM) | 0.766 | k star (KM) | 0.68 |
| nu hat (KM) | 29.1 | nu star (KM) | 25.84 |
| theta hat (KM) | 0.0472 | theta star (KM) | 0.0531 |
| 80% gamma percentile (KM) | 0.0594 | 90% gamma percentile (KM) | 0.0913 |
| 95% gamma percentile (KM) | 0.124 | 99% gamma percentile (KM) | 0.203 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (25.84, α) | 15.26 | Adjusted Chi Square Value (25.84, β) | 14.55 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.0612 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.0642 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.939 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.887 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.146 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.213 | Detected Data appear Lognormal at 5% Significance Level | |
| **Detected Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 0.0367 | Mean in Log Scale | -3.868 |
| SD in Original Scale | 0.0419 | SD in Log Scale | 1.146 |
| 95% t UCL (assumes normality of ROS data) | 0.0534 | 95% Percentile Bootstrap UCL | 0.0535 |
| 95% BCA Bootstrap UCL | 0.057 | 95% Bootstrap t UCL | 0.065 |
| 95% H-UCL (Log ROS) | 0.0864 | | |

**Attachment C**
**ProUCL 5.1 Output**

| Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution | | | |
|---|---|---|---|
| KM Mean (logged) | -4.926 | KM Geo Mean | 0.00725 |
| KM SD (logged) | 3.309 | 95% Critical H Value (KM-Log) | 6.656 |
| KM Standard Error of Mean (logged) | 0.784 | 95% H-UCL (KM -Log) | 310.8 |
| KM SD (logged) | 3.309 | 95% Critical H Value (KM-Log) | 6.656 |
| KM Standard Error of Mean (logged) | 0.784 | | |

| DL/2 Statistics | | | |
|---|---|---|---|
| DL/2 Normal | | DL/2 Log-Transformed | |
| Mean in Original Scale | 0.0361 | Mean in Log Scale | -4.927 |
| SD in Original Scale | 0.0424 | SD in Log Scale | 3.414 |
| 95% t UCL (Assumes normality) | 0.053 | 95% H-Stat UCL | 611.7 |

DL/2 is not a recommended method, provided for comparisons and historical reasons

**Nonparametric Distribution Free UCL Statistics**

Detected Data appear Approximate Normal Distributed at 5% Significance Level

**Suggested UCL to Use**

| 95% KM (t) UCL | 0.0531 | | |
|---|---|---|---|

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Conc (sd | downgradient estuarine | 7782-49-2 | tmet | n/a | yes)**

| General Statistics | | | |
|---|---|---|---|
| Total Number of Observations | 19 | Number of Distinct Observations | 14 |
| Number of Detects | 7 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 4 | Number of Distinct Non-Detects | 11 |
| Minimum Detect | 1.4 | Minimum Non-Detect | 1.3 |
| Maximum Detect | 3.4 | Maximum Non-Detect | 3 |
| Variance Detects | 0.478 | Percent Non-Detects | 63.16% |
| Mean Detects | 1.886 | SD Detects | 0.691 |
| Median Detects | 1.8 | CV Detects | 0.367 |
| Skewness Detects | 2.271 | Kurtosis Detects | 5.576 |
| Mean of Logged Detects | 0.59 | SD of Logged Detects | 0.301 |

| Normal GOF Test on Detects Only | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.679 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.406 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Normal at 5% Significance Level |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Detected Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 1.635 | KM Standard Error of Mean | 0.124 |
| KM SD | 0.46 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 1.851 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 1.84 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 2.008 | 95% KM Chebyshev UCL | 2.177 |
| 97.5% KM Chebyshev UCL | 2.412 | 99% KM Chebyshev UCL | 2.873 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.898 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.708 | Detected Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.38 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.312 | Detected Data Not Gamma Distributed at 5% Significance Level | |
| Detected Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 11.45 | k star (bias corrected MLE) | 6.639 |
| Theta hat (MLE) | 0.165 | Theta star (bias corrected MLE) | 0.284 |
| nu hat (MLE) | 160.3 | nu star (bias corrected) | 92.95 |
| Mean (detects) | 1.886 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.691 | Mean | 1.519 |
| Maximum | 3.4 | Median | 1.423 |
| SD | 0.533 | CV | 0.351 |
| k hat (MLE) | 10.85 | k star (bias corrected MLE) | 9.176 |
| Theta hat (MLE) | 0.14 | Theta star (bias corrected MLE) | 0.166 |
| nu hat (MLE) | 412.5 | nu star (bias corrected) | 348.7 |
| Adjusted Level of Significance (β) | 0.0369 | | |
| Approximate Chi Square Value (348.67, α) | 306.4 | Adjusted Chi Square Value (348.67, β) | 302.9 |
| 95% Gamma Approximate UCL (use when n>=50) | 1.729 | 95% Gamma Adjusted UCL (use when n<50) | 1.748 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 1.635 | SD (KM) | 0.46 |
| Variance (KM) | 0.212 | SE of Mean (KM) | 0.124 |
| k hat (KM) | 12.63 | k star (KM) | 10.67 |
| nu hat (KM) | 479.8 | nu star (KM) | 405.4 |
| theta hat (KM) | 0.13 | theta star (KM) | 0.153 |
| 80% gamma percentile (KM) | 2.035 | 90% gamma percentile (KM) | 2.3 |
| 95% gamma percentile (KM) | 2.536 | 99% gamma percentile (KM) | 3.019 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (405.36, α) | 359.7 | Adjusted Chi Square Value (405.36, β) | 355.9 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.843 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.862 |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.766 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.803 | Detected Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.36 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.304 | Detected Data Not Lognormal at 5% Significance Level | |
| **Detected Data Not Lognormal at 5% Significance Level** | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 1.571 | Mean in Log Scale | 0.418 |
| SD in Original Scale | 0.492 | SD in Log Scale | 0.248 |
| 95% t UCL (assumes normality of ROS data) | 1.767 | 95% Percentile Bootstrap UCL | 1.781 |
| 95% BCA Bootstrap UCL | 1.857 | 95% Bootstrap t UCL | 1.93 |
| 95% H-UCL (Log ROS) | 1.742 | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | 0.464 | KM Geo Mean | 1.59 |
| KM SD (logged) | 0.219 | 95% Critical H Value (KM-Log) | 1.792 |
| KM Standard Error of Mean (logged) | 0.0631 | 95% H-UCL (KM -Log) | 1.786 |
| KM SD (logged) | 0.219 | 95% Critical H Value (KM-Log) | 1.792 |
| KM Standard Error of Mean (logged) | 0.0631 | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 1.379 | Mean in Log Scale | 0.249 |
| SD in Original Scale | 0.601 | SD in Log Scale | 0.379 |
| 95% t UCL (Assumes normality) | 1.618 | 95% H-Stat UCL | 1.633 |
| **DL/2 is not a recommended method, provided for comparisons and historical reasons** | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data do not follow a Discernible Distribution at 5% Significance Level** | | | |
| **Suggested UCL to Use** | | | |
| 95% KM (t) UCL | 1.851 | KM H-UCL | 1.786 |
| 95% KM (BCA) UCL | N/A | | |
| **Warning: One or more Recommended UCL(s) not available!** | | | |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Attachment C**
**ProUCL 5.1 Output**

| Conc (sd \| downgradient estuarine \| teq-bird \| diox/fur \| n/a \| yes) | | | |
|---|---|---|---|
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 11 |
| | | Number of Missing Observations | 0 |
| Minimum | 3.6720E-8 | Mean | 1.2238E-6 |
| Maximum | 3.8848E-6 | Median | 8.1204E-7 |
| SD | 1.2884E-6 | Std. Error of Mean | 3.8846E-7 |
| Coefficient of Variation | N/A | Skewness | 0.935 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.865 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.228 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level | |
| Data appear Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 1.9278E-6 | 95% Adjusted-CLT UCL (Chen-1995) | 1.9797E-6 |
| | | 95% Modified-t UCL (Johnson-1978) | 1.9461E-6 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.411 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.768 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.19 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.266 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.675 | k star (bias corrected MLE) | 0.551 |
| Theta hat (MLE) | 1.8137E-6 | Theta star (bias corrected MLE) | 2.2197E-6 |
| nu hat (MLE) | 14.84 | nu star (bias corrected) | 12.13 |
| MLE Mean (bias corrected) | 1.2238E-6 | MLE Sd (bias corrected) | 1.6481E-6 |
| | | Approximate Chi Square Value (0.05) | 5.312 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 4.598 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 2.7942E-6 | 95% Adjusted Gamma UCL (use when n<50) | 3.2281E-6 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.902 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.209 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |

**Attachment C**
**ProUCL 5.1 Output**

| Lognormal Statistics | | | |
|---|---|---|---|
| Minimum of Logged Data | -17.12 | Mean of logged Data | -14.51 |
| Maximum of Logged Data | -12.46 | SD of logged Data | 1.686 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 2.2025E-5 | 90% Chebyshev (MVUE) UCL | 4.2660E-6 |
| 95% Chebyshev (MVUE) UCL | 5.4657E-6 | 97.5% Chebyshev (MVUE) UCL | 7.1308E-6 |
| 99% Chebyshev (MVUE) UCL | 1.0402E-5 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 1.8627E-6 | 95% Jackknife UCL | 1.9278E-6 |
| 95% Standard Bootstrap UCL | 1.8234E-6 | 95% Bootstrap-t UCL | 2.1503E-6 |
| 95% Hall's Bootstrap UCL | 2.0746E-6 | 95% Percentile Bootstrap UCL | 1.8461E-6 |
| 95% BCA Bootstrap UCL | 1.9758E-6 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2.3891E-6 | 95% Chebyshev(Mean, Sd) UCL | 2.9170E-6 |
| 97.5% Chebyshev(Mean, Sd) UCL | 3.6497E-6 | 99% Chebyshev(Mean, Sd) UCL | 5.0889E-6 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 1.93E-06 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| teq-fish \| diox/fur \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 11 |
| | | Number of Missing Observations | 0 |
| Minimum | 3.6720E-8 | Mean | 5.6759E-7 |
| Maximum | 2.9291E-6 | Median | 2.8788E-7 |
| SD | 8.1695E-7 | Std. Error of Mean | 2.4632E-7 |
| Coefficient of Variation | N/A | Skewness | 2.843 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.611 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.334 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
|---|---|---|---|
| 95% Student's-t UCL | 1.0140E-6 | 95% Adjusted-CLT UCL (Chen-1995) | 1.1984E-6 |
| | | 95% Modified-t UCL (Johnson-1978) | 1.0492E-6 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.421 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.758 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.186 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.264 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.847 | k star (bias corrected MLE) | 0.677 |
| Theta hat (MLE) | 6.6976E-7 | Theta star (bias corrected MLE) | 8.3847E-7 |
| nu hat (MLE) | 18.64 | nu star (bias corrected) | 14.89 |
| MLE Mean (bias corrected) | 5.6759E-7 | MLE Sd (bias corrected) | 6.8986E-7 |
| | | Approximate Chi Square Value (0.05) | 7.187 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 6.334 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 1.1762E-6 | 95% Adjusted Gamma UCL (use when n<50) | 1.3346E-6 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.954 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.163 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | -17.12 | Mean of logged Data | -15.08 |
| Maximum of Logged Data | -12.74 | SD of logged Data | 1.276 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 2.6823E-6 | 90% Chebyshev (MVUE) UCL | 1.2769E-6 |
| 95% Chebyshev (MVUE) UCL | 1.5969E-6 | 97.5% Chebyshev (MVUE) UCL | 2.0412E-6 |
| 99% Chebyshev (MVUE) UCL | 2.9137E-6 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 9.7275E-7 | 95% Jackknife UCL | 1.0140E-6 |
| 95% Standard Bootstrap UCL | 9.5846E-7 | 95% Bootstrap-t UCL | 1.8078E-6 |
| 95% Hall's Bootstrap UCL | 2.5678E-6 | 95% Percentile Bootstrap UCL | 1.0512E-6 |
| 95% BCA Bootstrap UCL | 1.1865E-6 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1.3065E-6 | 95% Chebyshev(Mean, Sd) UCL | 1.6413E-6 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 97.5% Chebyshev(Mean, Sd) UCL | 2.1058E-6 | 99% Chebyshev(Mean, Sd) UCL | 3.0184E-6 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 1.33E-06 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (sd \| downgradient estuarine \| teq-mammal \| diox/fur \| n/a \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 11 | Number of Distinct Observations | 11 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.1016E-7 | Mean | 1.5340E-6 |
| Maximum | 4.8763E-6 | Median | 8.0060E-7 |
| SD | 1.4283E-6 | Std. Error of Mean | 4.3065E-7 |
| Coefficient of Variation | N/A | Skewness | 1.345 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.864 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.242 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Normal at 5% Significance Level | |
| **Data appear Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 2.3145E-6 | 95% Adjusted-CLT UCL (Chen-1995) | 2.4289E-6 |
| | | 95% Modified-t UCL (Johnson-1978) | 2.3436E-6 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.225 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.748 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.169 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.261 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 1.184 | k star (bias corrected MLE) | 0.922 |
| Theta hat (MLE) | 1.2957E-6 | Theta star (bias corrected MLE) | 1.6645E-6 |
| nu hat (MLE) | 26.05 | nu star (bias corrected) | 20.28 |
| MLE Mean (bias corrected) | 1.5340E-6 | MLE Sd (bias corrected) | 1.5979E-6 |
| | | Approximate Chi Square Value (0.05) | 11.05 |
| Adjusted Level of Significance | 0.0278 | Adjusted Chi Square Value | 9.961 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 2.8136E-6 | 95% Adjusted Gamma UCL (use when n<50) | 3.1223E-6 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.961 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.85 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.171 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.251 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | -16.02 | Mean of logged Data | -13.87 |
| Maximum of Logged Data | -12.23 | SD of logged Data | 1.136 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 5.8572E-6 | 90% Chebyshev (MVUE) UCL | 3.4925E-6 |
| 95% Chebyshev (MVUE) UCL | 4.3201E-6 | 97.5% Chebyshev (MVUE) UCL | 5.4688E-6 |
| 99% Chebyshev (MVUE) UCL | 7.7251E-6 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 2.2424E-6 | 95% Jackknife UCL | 2.3145E-6 |
| 95% Standard Bootstrap UCL | 2.2230E-6 | 95% Bootstrap-t UCL | 2.6611E-6 |
| 95% Hall's Bootstrap UCL | 2.7229E-6 | 95% Percentile Bootstrap UCL | 2.2633E-6 |
| 95% BCA Bootstrap UCL | 2.4034E-6 | | |
| 90% Chebyshev(Mean, Sd) UCL | 2.8260E-6 | 95% Chebyshev(Mean, Sd) UCL | 3.4112E-6 |
| 97.5% Chebyshev(Mean, Sd) UCL | 4.2234E-6 | 99% Chebyshev(Mean, Sd) UCL | 5.8189E-6 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 2.31E-06 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| central aoc \| 7439-92-1 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 3.4 | Mean | 23.57 |
| Maximum | 121 | Median | 11.7 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| SD | 37.22 | Std. Error of Mean | 12.41 |
| Coefficient of Variation | 1.579 | Skewness | 2.797 |
| | | | |
| Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use | | | |
| guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. | | | |
| For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). | | | |
| Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1 | | | |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.564 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.383 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 46.64 | 95% Adjusted-CLT UCL (Chen-1995) | 56.33 |
| | | 95% Modified-t UCL (Johnson-1978) | 48.57 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.713 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.747 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.241 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.288 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.886 | k star (bias corrected MLE) | 0.665 |
| Theta hat (MLE) | 26.59 | Theta star (bias corrected MLE) | 35.45 |
| nu hat (MLE) | 15.95 | nu star (bias corrected) | 11.97 |
| MLE Mean (bias corrected) | 23.57 | MLE Sd (bias corrected) | 28.9 |
| | | Approximate Chi Square Value (0.05) | 5.206 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 4.304 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 54.18 | 95% Adjusted Gamma UCL (use when n<50) | 65.53 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.922 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.157 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.224 | Mean of logged Data | 2.499 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Maximum of Logged Data | 4.796 | SD of logged Data | 1.105 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 87.22 | 90% Chebyshev (MVUE) UCL | 43.8 |
| 95% Chebyshev (MVUE) UCL | 54.4 | 97.5% Chebyshev (MVUE) UCL | 69.11 |
| 99% Chebyshev (MVUE) UCL | 98 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 43.97 | 95% Jackknife UCL | 46.64 |
| 95% Standard Bootstrap UCL | 42.91 | 95% Bootstrap-t UCL | 118.4 |
| 95% Hall's Bootstrap UCL | 123.8 | 95% Percentile Bootstrap UCL | 46.69 |
| 95% BCA Bootstrap UCL | 60.19 | | |
| 90% Chebyshev(Mean, Sd) UCL | 60.79 | 95% Chebyshev(Mean, Sd) UCL | 77.65 |
| 97.5% Chebyshev(Mean, Sd) UCL | 101 | 99% Chebyshev(Mean, Sd) UCL | 147 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 65.53 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| central aoc \| 7439-96-5 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 40.4 | Mean | 136.4 |
| Maximum | 372 | Median | 130 |
| SD | 101.4 | Std. Error of Mean | 33.78 |
| Coefficient of Variation | 0.743 | Skewness | 1.74 |
| | | | |
| **Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use** | | | |
| **guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.** | | | |
| **For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).** | | | |
| **Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1** | | | |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.822 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.275 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 199.2 | 95% Adjusted-CLT UCL (Chen-1995) | 212.9 |
| | | 95% Modified-t UCL (Johnson-1978) | 202.5 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.327 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.728 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.19 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.282 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 2.432 | k star (bias corrected MLE) | 1.695 |
| Theta hat (MLE) | 56.09 | Theta star (bias corrected MLE) | 80.46 |
| nu hat (MLE) | 43.77 | nu star (bias corrected) | 30.51 |
| MLE Mean (bias corrected) | 136.4 | MLE Sd (bias corrected) | 104.8 |
| | | Approximate Chi Square Value (0.05) | 18.9 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 17 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 220.2 | 95% Adjusted Gamma UCL (use when n<50) | 244.9 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.95 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.169 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 3.699 | Mean of logged Data | 4.696 |
| Maximum of Logged Data | 5.919 | SD of logged Data | 0.704 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 269.8 | 90% Chebyshev (MVUE) UCL | 233.9 |
| 95% Chebyshev (MVUE) UCL | 278.3 | 97.5% Chebyshev (MVUE) UCL | 339.9 |
| 99% Chebyshev (MVUE) UCL | 460.9 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 192 | 95% Jackknife UCL | 199.2 |
| 95% Standard Bootstrap UCL | 189.2 | 95% Bootstrap-t UCL | 242.7 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% Hall's Bootstrap UCL | 480.4 | 95% Percentile Bootstrap UCL | 192.2 |
| 95% BCA Bootstrap UCL | 208.5 | | |
| 90% Chebyshev(Mean, Sd) UCL | 237.7 | 95% Chebyshev(Mean, Sd) UCL | 283.7 |
| 97.5% Chebyshev(Mean, Sd) UCL | 347.4 | 99% Chebyshev(Mean, Sd) UCL | 472.5 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 244.9 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| central aoc \| 7439-97-6 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.014 | Mean | 0.0792 |
| Maximum | 0.23 | Median | 0.051 |
| SD | 0.0824 | Std. Error of Mean | 0.0275 |
| Coefficient of Variation | 1.041 | Skewness | 1.397 |
| | | | |
| **Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use** | | | |
| **guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.** | | | |
| **For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).** | | | |
| **Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1** | | | |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.745 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.296 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |
| **Data Not Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 0.13 | 95% Adjusted-CLT UCL (Chen-1995) | 0.138 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.132 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.56 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.739 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.221 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.285 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Gamma Statistics** | | | |
| k hat (MLE) | 1.27 | k star (bias corrected MLE) | 0.921 |
| Theta hat (MLE) | 0.0624 | Theta star (bias corrected MLE) | 0.086 |
| nu hat (MLE) | 22.87 | nu star (bias corrected) | 16.58 |
| MLE Mean (bias corrected) | 0.0792 | MLE Sd (bias corrected) | 0.0826 |
| | | Approximate Chi Square Value (0.05) | 8.371 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 7.176 |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 0.157 | 95% Adjusted Gamma UCL (use when n<50) | 0.183 |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.925 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.161 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | -4.269 | Mean of logged Data | -2.978 |
| Maximum of Logged Data | -1.47 | SD of logged Data | 0.98 |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 0.249 | 90% Chebyshev (MVUE) UCL | 0.154 |
| 95% Chebyshev (MVUE) UCL | 0.19 | 97.5% Chebyshev (MVUE) UCL | 0.239 |
| 99% Chebyshev (MVUE) UCL | 0.335 | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 0.124 | 95% Jackknife UCL | 0.13 |
| 95% Standard Bootstrap UCL | 0.121 | 95% Bootstrap-t UCL | 0.236 |
| 95% Hall's Bootstrap UCL | 0.403 | 95% Percentile Bootstrap UCL | 0.125 |
| 95% BCA Bootstrap UCL | 0.135 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.162 | 95% Chebyshev(Mean, Sd) UCL | 0.199 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.251 | 99% Chebyshev(Mean, Sd) UCL | 0.353 |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 0.183 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Conc (so \| central aoc \| 7440-02-0 \| tmet \| surface soil \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.9 | Mean | 60.99 |
| Maximum | 502 | Median | 5.1 |
| SD | 165.4 | Std. Error of Mean | 55.13 |
| Coefficient of Variation | 2.712 | Skewness | 2.999 |
| **Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use** | | | |
| **guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.** | | | |
| **For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).** | | | |
| **Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1** | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.403 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.509 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |
| **Data Not Normal at 5% Significance Level** | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 163.5 | 95% Adjusted-CLT UCL (Chen-1995) | 210.6 |
| | | 95% Modified-t UCL (Johnson-1978) | 172.7 |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 2.252 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.798 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.479 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.3 | Data Not Gamma Distributed at 5% Significance Level | |
| **Data Not Gamma Distributed at 5% Significance Level** | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.35 | k star (bias corrected MLE) | 0.307 |
| Theta hat (MLE) | 174.4 | Theta star (bias corrected MLE) | 198.5 |
| nu hat (MLE) | 6.296 | nu star (bias corrected) | 5.531 |
| MLE Mean (bias corrected) | 60.99 | MLE Sd (bias corrected) | 110 |
| | | Approximate Chi Square Value (0.05) | 1.405 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 1.015 |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 240.1 | 95% Adjusted Gamma UCL (use when n<50) | 332.2 |
| **Lognormal GOF Test** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.626 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.355 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.065 | Mean of logged Data | 2.188 |
| Maximum of Logged Data | 6.219 | SD of logged Data | 1.564 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 386.3 | 90% Chebyshev (MVUE) UCL | 62.74 |
| 95% Chebyshev (MVUE) UCL | 80.27 | 97.5% Chebyshev (MVUE) UCL | 104.6 |
| 99% Chebyshev (MVUE) UCL | 152.4 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 151.7 | 95% Jackknife UCL | 163.5 |
| 95% Standard Bootstrap UCL | 149.3 | 95% Bootstrap-t UCL | 4852 |
| 95% Hall's Bootstrap UCL | 3865 | 95% Percentile Bootstrap UCL | 170.9 |
| 95% BCA Bootstrap UCL | 226.2 | | |
| 90% Chebyshev(Mean, Sd) UCL | 226.4 | 95% Chebyshev(Mean, Sd) UCL | 301.3 |
| 97.5% Chebyshev(Mean, Sd) UCL | 405.3 | 99% Chebyshev(Mean, Sd) UCL | 609.6 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Hall's Bootstrap UCL | 3865 | | |
| | | | |
| Recommended UCL exceeds the maximum observation | | | |
| | | | |
| In Case Bootstrap t and/or Hall's Bootstrap yields an unreasonably large UCL value, use 97.5% or 99% Chebyshev (Mean, Sd) UCL | | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| central aoc \| 7440-28-0 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.03 | Mean | 0.0824 |
| Maximum | 0.2 | Median | 0.068 |
| SD | 0.053 | Std. Error of Mean | 0.0177 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Coefficient of Variation | 0.643 | Skewness | 1.433 |
| | | | |
| Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use | | | |
| guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. | | | |
| For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). | | | |
| Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1 | | | |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.863 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.191 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data appear Normal at 5% Significance Level | |
| Data appear Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 0.115 | 95% Adjusted-CLT UCL (Chen-1995) | 0.121 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.117 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.27 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.727 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.143 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.281 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 3.128 | k star (bias corrected MLE) | 2.16 |
| Theta hat (MLE) | 0.0264 | Theta star (bias corrected MLE) | 0.0382 |
| nu hat (MLE) | 56.31 | nu star (bias corrected) | 38.87 |
| MLE Mean (bias corrected) | 0.0824 | MLE Sd (bias corrected) | 0.0561 |
| | | Approximate Chi Square Value (0.05) | 25.59 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 23.34 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 0.125 | 95% Adjusted Gamma UCL (use when n<50) | 0.137 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.964 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.162 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | -3.507 | Mean of logged Data | -2.664 |
| Maximum of Logged Data | -1.609 | SD of logged Data | 0.611 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 0.143 | 90% Chebyshev (MVUE) UCL | 0.133 |
| 95% Chebyshev (MVUE) UCL | 0.156 | 97.5% Chebyshev (MVUE) UCL | 0.188 |
| 99% Chebyshev (MVUE) UCL | 0.252 | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 0.112 | 95% Jackknife UCL | 0.115 |
| 95% Standard Bootstrap UCL | 0.11 | 95% Bootstrap-t UCL | 0.132 |
| 95% Hall's Bootstrap UCL | 0.144 | 95% Percentile Bootstrap UCL | 0.111 |
| 95% BCA Bootstrap UCL | 0.118 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.135 | 95% Chebyshev(Mean, Sd) UCL | 0.16 |
| 97.5% Chebyshev(Mean, Sd) UCL | 0.193 | 99% Chebyshev(Mean, Sd) UCL | 0.258 |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 0.115 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (so \| central aoc \| 7440-47-3 \| tmet \| surface soil \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.3 | Mean | 22.57 |
| Maximum | 126 | Median | 8.4 |
| SD | 39.04 | Std. Error of Mean | 13.01 |
| Coefficient of Variation | 1.73 | Skewness | 2.929 |
| **Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use** | | | |
| **guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.** | | | |
| **For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).** | | | |
| **Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1** | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.477 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.408 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |
| **Data Not Normal at 5% Significance Level** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 46.77 | 95% Adjusted-CLT UCL (Chen-1995) | 57.55 |
| | | 95% Modified-t UCL (Johnson-1978) | 48.88 |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 1.658 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.746 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.397 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.288 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.918 | k star (bias corrected MLE) | 0.686 |
| Theta hat (MLE) | 24.59 | Theta star (bias corrected MLE) | 32.9 |
| nu hat (MLE) | 16.52 | nu star (bias corrected) | 12.34 |
| MLE Mean (bias corrected) | 22.57 | MLE Sd (bias corrected) | 27.25 |
| | | Approximate Chi Square Value (0.05) | 5.455 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 4.527 |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 51.07 | 95% Adjusted Gamma UCL (use when n<50) | 61.53 |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.718 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.343 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.668 | Mean of logged Data | 2.481 |
| Maximum of Logged Data | 4.836 | SD of logged Data | 0.959 |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 55.02 | 90% Chebyshev (MVUE) UCL | 35.28 |
| 95% Chebyshev (MVUE) UCL | 43.24 | 97.5% Chebyshev (MVUE) UCL | 54.29 |
| 99% Chebyshev (MVUE) UCL | 75.99 | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 43.97 | 95% Jackknife UCL | 46.77 |
| 95% Standard Bootstrap UCL | 42.97 | 95% Bootstrap-t UCL | 390.6 |
| 95% Hall's Bootstrap UCL | 207.4 | 95% Percentile Bootstrap UCL | 47.61 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% BCA Bootstrap UCL | 60.63 | | |
| 90% Chebyshev(Mean, Sd) UCL | 61.61 | 95% Chebyshev(Mean, Sd) UCL | 79.29 |
| 97.5% Chebyshev(Mean, Sd) UCL | 103.8 | 99% Chebyshev(Mean, Sd) UCL | 152 |

**Suggested UCL to Use**

| | | | |
|---|---|---|---|
| 95% Chebyshev (Mean, Sd) UCL | 79.29 | | |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Conc (so | central aoc | 7440-48-4 | tmet | surface soil | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 9 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 1.5 | Mean | 5.411 |
| Maximum | 28 | Median | 2.3 |
| SD | 8.525 | Std. Error of Mean | 2.842 |
| Coefficient of Variation | 1.575 | Skewness | 2.929 |

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1

**Normal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.485 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.417 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

**Assuming Normal Distribution**

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 10.7 | 95% Adjusted-CLT UCL (Chen-1995) | 13.05 |
| | | 95% Modified-t UCL (Johnson-1978) | 11.16 |

**Gamma GOF Test**

| | | |
|---|---|---|
| A-D Test Statistic | 1.587 | **Anderson-Darling Gamma GOF Test** |
| 5% A-D Critical Value | 0.742 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.345 | **Kolmogorov-Smirnov Gamma GOF Test** |
| 5% K-S Critical Value | 0.286 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

**Attachment C**
**ProUCL 5.1 Output**

| Gamma Statistics | | | |
|---|---|---|---|
| k hat (MLE) | 1.089 | k star (bias corrected MLE) | 0.8 |
| Theta hat (MLE) | 4.968 | Theta star (bias corrected MLE) | 6.763 |
| nu hat (MLE) | 19.6 | nu star (bias corrected) | 14.4 |
| MLE Mean (bias corrected) | 5.411 | MLE Sd (bias corrected) | 6.049 |
| | | Approximate Chi Square Value (0.05) | 6.848 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 5.786 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 11.38 | 95% Adjusted Gamma UCL (use when n<50) | 13.47 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.726 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.278 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 0.405 | Mean of logged Data | 1.164 |
| Maximum of Logged Data | 3.332 | SD of logged Data | 0.877 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 11.83 | 90% Chebyshev (MVUE) UCL | 8.495 |
| 95% Chebyshev (MVUE) UCL | 10.32 | 97.5% Chebyshev (MVUE) UCL | 12.86 |
| 99% Chebyshev (MVUE) UCL | 17.84 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 10.09 | 95% Jackknife UCL | 10.7 |
| 95% Standard Bootstrap UCL | 9.78 | 95% Bootstrap-t UCL | 62.11 |
| 95% Hall's Bootstrap UCL | 35.2 | 95% Percentile Bootstrap UCL | 10.93 |
| 95% BCA Bootstrap UCL | 14.42 | | |
| 90% Chebyshev(Mean, Sd) UCL | 13.94 | 95% Chebyshev(Mean, Sd) UCL | 17.8 |
| 97.5% Chebyshev(Mean, Sd) UCL | 23.16 | 99% Chebyshev(Mean, Sd) UCL | 33.69 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Chebyshev (Mean, Sd) UCL | 17.8 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |

**Attachment C**
**ProUCL 5.1 Output**

| Conc (so \| central aoc \| 7440-62-2 \| tmet \| surface soil \| yes) | | | |
|---|---|---|---|
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 8 |
| | | Number of Missing Observations | 0 |
| Minimum | 7 | Mean | 13.27 |
| Maximum | 32.5 | Median | 10.3 |
| SD | 7.534 | Std. Error of Mean | 2.511 |
| Coefficient of Variation | 0.568 | Skewness | 2.527 |
| | | | |
| Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use | | | |
| guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. | | | |
| For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). | | | |
| Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1 | | | |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.667 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.329 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 17.94 | 95% Adjusted-CLT UCL (Chen-1995) | 19.66 |
| | | 95% Modified-t UCL (Johnson-1978) | 18.29 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.883 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.723 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.257 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.28 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data follow Appr. Gamma Distribution at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 5.311 | k star (bias corrected MLE) | 3.615 |
| Theta hat (MLE) | 2.498 | Theta star (bias corrected MLE) | 3.67 |
| nu hat (MLE) | 95.6 | nu star (bias corrected) | 65.07 |
| MLE Mean (bias corrected) | 13.27 | MLE Sd (bias corrected) | 6.978 |
| | | Approximate Chi Square Value (0.05) | 47.51 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 44.36 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 18.17 | 95% Adjusted Gamma UCL (use when n<50) | 19.46 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.842 | **Shapiro Wilk Lognormal GOF Test** | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.227 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.946 | Mean of logged Data | 2.488 |
| Maximum of Logged Data | 3.481 | SD of logged Data | 0.427 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 18.29 | 90% Chebyshev (MVUE) UCL | 18.69 |
| 95% Chebyshev (MVUE) UCL | 21.24 | 97.5% Chebyshev (MVUE) UCL | 24.79 |
| 99% Chebyshev (MVUE) UCL | 31.75 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 17.4 | 95% Jackknife UCL | 17.94 |
| 95% Standard Bootstrap UCL | 17.12 | 95% Bootstrap-t UCL | 25.68 |
| 95% Hall's Bootstrap UCL | 35.4 | 95% Percentile Bootstrap UCL | 17.7 |
| 95% BCA Bootstrap UCL | 20.43 | | |
| 90% Chebyshev(Mean, Sd) UCL | 20.8 | 95% Chebyshev(Mean, Sd) UCL | 24.21 |
| 97.5% Chebyshev(Mean, Sd) UCL | 28.95 | 99% Chebyshev(Mean, Sd) UCL | 38.26 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 19.46 | | |
| | | | |
| When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test | | | |
| When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL | | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| central aoc \| 7440-66-6 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 9 | Number of Distinct Observations | 9 |
| | | Number of Missing Observations | 0 |
| Minimum | 7.4 | Mean | 40.64 |
| Maximum | 146 | Median | 21.9 |
| SD | 47.87 | Std. Error of Mean | 15.96 |
| Coefficient of Variation | 1.178 | Skewness | 1.817 |
| | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use | | | |
| guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. | | | |
| For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). | | | |
| Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1 | | | |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.685 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.415 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 70.32 | 95% Adjusted-CLT UCL (Chen-1995) | 77.22 |
| | | 95% Modified-t UCL (Johnson-1978) | 71.93 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.857 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.741 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.358 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.286 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 1.155 | k star (bias corrected MLE) | 0.844 |
| Theta hat (MLE) | 35.19 | Theta star (bias corrected MLE) | 48.15 |
| nu hat (MLE) | 20.79 | nu star (bias corrected) | 15.19 |
| MLE Mean (bias corrected) | 40.64 | MLE Sd (bias corrected) | 44.24 |
| | | Approximate Chi Square Value (0.05) | 7.396 |
| Adjusted Level of Significance | 0.0231 | Adjusted Chi Square Value | 6.285 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 83.49 | 95% Adjusted Gamma UCL (use when n<50) | 98.26 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.877 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.295 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Data Not Lognormal at 5% Significance Level | |
| Data appear Approximate Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.001 | Mean of logged Data | 3.213 |
| Maximum of Logged Data | 4.984 | SD of logged Data | 1 |
| | | | |
| **Assuming Lognormal Distribution** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% H-UCL | 128.9 | 90% Chebyshev (MVUE) UCL | 77.54 |
| 95% Chebyshev (MVUE) UCL | 95.42 | 97.5% Chebyshev (MVUE) UCL | 120.2 |
| 99% Chebyshev (MVUE) UCL | 169 | | |

**Nonparametric Distribution Free UCL Statistics**

Data appear to follow a Discernible Distribution at 5% Significance Level

**Nonparametric Distribution Free UCLs**

| | | | |
|---|---|---|---|
| 95% CLT UCL | 66.89 | 95% Jackknife UCL | 70.32 |
| 95% Standard Bootstrap UCL | 65.3 | 95% Bootstrap-t UCL | 209.4 |
| 95% Hall's Bootstrap UCL | 320.7 | 95% Percentile Bootstrap UCL | 66.6 |
| 95% BCA Bootstrap UCL | 75.22 | | |
| 90% Chebyshev(Mean, Sd) UCL | 88.51 | 95% Chebyshev(Mean, Sd) UCL | 110.2 |
| 97.5% Chebyshev(Mean, Sd) UCL | 140.3 | 99% Chebyshev(Mean, Sd) UCL | 199.4 |

**Suggested UCL to Use**

| | | | |
|---|---|---|---|
| 95% Chebyshev (Mean, Sd) UCL | 110.2 | | |

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Conc (so | southern aoc | 117-81-7 | svoc | surface soil | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 11 |
| Number of Detects | 5 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 5 | Number of Distinct Non-Detects | 6 |
| Minimum Detect | 0.0525 | Minimum Non-Detect | 4.7000E-5 |
| Maximum Detect | 0.199 | Maximum Non-Detect | 1.6000E-4 |
| Variance Detects | 0.00287 | Percent Non-Detects | 64.29% |
| Mean Detects | 0.118 | SD Detects | 0.0535 |
| Median Detects | 0.111 | CV Detects | 0.454 |
| Skewness Detects | 0.662 | Kurtosis Detects | 1.378 |
| Mean of Logged Detects | -2.226 | SD of Logged Detects | 0.485 |

**Normal GOF Test on Detects Only**

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.966 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.211 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data appear Normal at 5% Significance Level | |

Detected Data appear Normal at 5% Significance Level

**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**

| | | | |
|---|---|---|---|
| KM Mean | 0.0422 | KM Standard Error of Mean | 0.0189 |
| KM SD | 0.0633 | 95% KM (BCA) UCL | 0.074 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% KM (t) UCL | 0.0757 | 95% KM (Percentile Bootstrap) UCL | 0.0709 |
| 95% KM (z) UCL | 0.0733 | 95% KM Bootstrap t UCL | 0.0608 |
| 90% KM Chebyshev UCL | 0.0989 | 95% KM Chebyshev UCL | 0.125 |
| 97.5% KM Chebyshev UCL | 0.16 | 99% KM Chebyshev UCL | 0.23 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.215 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.68 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.179 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.358 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 5.81 | k star (bias corrected MLE) | 2.458 |
| Theta hat (MLE) | 0.0203 | Theta star (bias corrected MLE) | 0.048 |
| nu hat (MLE) | 58.1 | nu star (bias corrected) | 24.58 |
| Mean (detects) | 0.118 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.01 | Mean | 0.0486 |
| Maximum | 0.199 | Median | 0.01 |
| SD | 0.0614 | CV | 1.263 |
| k hat (MLE) | 0.811 | k star (bias corrected MLE) | 0.685 |
| Theta hat (MLE) | 0.0599 | Theta star (bias corrected MLE) | 0.0709 |
| nu hat (MLE) | 22.71 | nu star (bias corrected) | 19.17 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (19.17, α) | 10.25 | Adjusted Chi Square Value (19.17, β) | 9.389 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.0909 | 95% Gamma Adjusted UCL (use when n<50) | 0.0992 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 0.0422 | SD (KM) | 0.0633 |
| Variance (KM) | 0.00401 | SE of Mean (KM) | 0.0189 |
| k hat (KM) | 0.443 | k star (KM) | 0.396 |
| nu hat (KM) | 12.41 | nu star (KM) | 11.08 |
| theta hat (KM) | 0.0952 | theta star (KM) | 0.107 |
| 80% gamma percentile (KM) | 0.068 | 90% gamma percentile (KM) | 0.119 |
| 95% gamma percentile (KM) | 0.176 | 99% gamma percentile (KM) | 0.318 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (11.08, α) | 4.629 | Adjusted Chi Square Value (11.08, β) | 4.089 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.101 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.114 |

**Attachment C**
**ProUCL 5.1 Output**

| Lognormal GOF Test on Detected Observations Only | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.971 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.216 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data appear Lognormal at 5% Significance Level | |
| Detected Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 0.0559 | Mean in Log Scale | -3.292 |
| SD in Original Scale | 0.0567 | SD in Log Scale | 0.899 |
| 95% t UCL (assumes normality of ROS data) | 0.0827 | 95% Percentile Bootstrap UCL | 0.0827 |
| 95% BCA Bootstrap UCL | 0.0871 | 95% Bootstrap t UCL | 0.0985 |
| 95% H-UCL (Log ROS) | 0.107 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | -7.201 | KM Geo Mean | 7.4568E-4 |
| KM SD (logged) | 3.718 | 95% Critical H Value (KM-Log) | 8.261 |
| KM Standard Error of Mean (logged) | 1.111 | 95% H-UCL (KM -Log) | 3739 |
| KM SD (logged) | 3.718 | 95% Critical H Value (KM-Log) | 8.261 |
| KM Standard Error of Mean (logged) | 1.111 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 0.0422 | Mean in Log Scale | -7.363 |
| SD in Original Scale | 0.0657 | SD in Log Scale | 4.007 |
| 95% t UCL (Assumes normality) | 0.0733 | 95% H-Stat UCL | 37375 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Detected Data appear Normal Distributed at 5% Significance Level | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% KM (t) UCL | 0.0757 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7439-92-1 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.4 | Mean | 524.7 |
| Maximum | 2120 | Median | 300.5 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| SD | 638 | Std. Error of Mean | 170.5 |
| Coefficient of Variation | 1.216 | Skewness | 1.484 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.817 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.208 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Normal at 5% Significance Level | |
| **Data appear Approximate Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 826.6 | 95% Adjusted-CLT UCL (Chen-1995) | 877.4 |
| | | 95% Modified-t UCL (Johnson-1978) | 837.9 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.455 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.793 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.212 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.242 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.499 | k star (bias corrected MLE) | 0.44 |
| Theta hat (MLE) | 1052 | Theta star (bias corrected MLE) | 1194 |
| nu hat (MLE) | 13.97 | nu star (bias corrected) | 12.31 |
| MLE Mean (bias corrected) | 524.7 | MLE Sd (bias corrected) | 791.3 |
| | | Approximate Chi Square Value (0.05) | 5.43 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 4.837 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 1189 | 95% Adjusted Gamma UCL (use when n<50) | 1335 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.881 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.2 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.686 | Mean of logged Data | 4.989 |
| Maximum of Logged Data | 7.659 | SD of logged Data | 2.11 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 23911 | 90% Chebyshev (MVUE) UCL | 2705 |
| 95% Chebyshev (MVUE) UCL | 3508 | 97.5% Chebyshev (MVUE) UCL | 4623 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 99% Chebyshev (MVUE) UCL | 6813 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 805.1 | 95% Jackknife UCL | 826.6 |
| 95% Standard Bootstrap UCL | 795.8 | 95% Bootstrap-t UCL | 969.9 |
| 95% Hall's Bootstrap UCL | 1012 | 95% Percentile Bootstrap UCL | 804.3 |
| 95% BCA Bootstrap UCL | 861 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1036 | 95% Chebyshev(Mean, Sd) UCL | 1268 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1589 | 99% Chebyshev(Mean, Sd) UCL | 2221 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 826.6 | | |
| | | | |
| When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test | | | |
| When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL | | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7439-96-5 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 148 | Mean | 404.1 |
| Maximum | 1490 | Median | 278 |
| SD | 371.7 | Std. Error of Mean | 99.34 |
| Coefficient of Variation | 0.92 | Skewness | 2.475 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.612 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.365 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| **Data Not Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 580.1 | 95% Adjusted-CLT UCL (Chen-1995) | 637.8 |
| | | 95% Modified-t UCL (Johnson-1978) | 591 |
| | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 1.551 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.745 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.314 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.231 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 2.288 | k star (bias corrected MLE) | 1.845 |
| Theta hat (MLE) | 176.6 | Theta star (bias corrected MLE) | 219 |
| nu hat (MLE) | 64.06 | nu star (bias corrected) | 51.67 |
| MLE Mean (bias corrected) | 404.1 | MLE Sd (bias corrected) | 297.5 |
| | | Approximate Chi Square Value (0.05) | 36.16 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 34.44 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 577.5 | 95% Adjusted Gamma UCL (use when n<50) | 606.3 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.827 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.266 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 4.997 | Mean of logged Data | 5.768 |
| Maximum of Logged Data | 7.307 | SD of logged Data | 0.629 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 577 | 90% Chebyshev (MVUE) UCL | 584.8 |
| 95% Chebyshev (MVUE) UCL | 676.1 | 97.5% Chebyshev (MVUE) UCL | 802.7 |
| 99% Chebyshev (MVUE) UCL | 1052 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 567.5 | 95% Jackknife UCL | 580.1 |
| 95% Standard Bootstrap UCL | 562.3 | 95% Bootstrap-t UCL | 1202 |
| 95% Hall's Bootstrap UCL | 1597 | 95% Percentile Bootstrap UCL | 581.1 |
| 95% BCA Bootstrap UCL | 650.3 | | |
| 90% Chebyshev(Mean, Sd) UCL | 702.2 | 95% Chebyshev(Mean, Sd) UCL | 837.1 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1024 | 99% Chebyshev(Mean, Sd) UCL | 1393 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Chebyshev (Mean, Sd) UCL | 837.1 | | |

**Attachment C**
**ProUCL 5.1 Output**

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

**Conc (so | southern aoc | 7439-97-6 | tmet | surface soil | yes)**

**General Statistics**

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 0.04 | Mean | 0.257 |
| Maximum | 1.8 | Median | 0.16 |
| SD | 0.453 | Std. Error of Mean | 0.121 |
| Coefficient of Variation | 1.763 | Skewness | 3.499 |

**Normal GOF Test**

| | | |
|---|---|---|
| Shapiro Wilk Test Statistic | 0.469 | **Shapiro Wilk GOF Test** |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level |
| Lilliefors Test Statistic | 0.363 | **Lilliefors GOF Test** |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level |

Data Not Normal at 5% Significance Level

**Assuming Normal Distribution**

| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
|---|---|---|---|
| 95% Student's-t UCL | 0.471 | 95% Adjusted-CLT UCL (Chen-1995) | 0.577 |
| | | 95% Modified-t UCL (Johnson-1978) | 0.49 |

**Gamma GOF Test**

| | | |
|---|---|---|
| A-D Test Statistic | 1.184 | **Anderson-Darling Gamma GOF Test** |
| 5% A-D Critical Value | 0.764 | Data Not Gamma Distributed at 5% Significance Level |
| K-S Test Statistic | 0.249 | **Kolmogorov-Smirnov Gamma GOF Test** |
| 5% K-S Critical Value | 0.236 | Data Not Gamma Distributed at 5% Significance Level |

Data Not Gamma Distributed at 5% Significance Level

**Gamma Statistics**

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.897 | k star (bias corrected MLE) | 0.752 |
| Theta hat (MLE) | 0.286 | Theta star (bias corrected MLE) | 0.341 |
| nu hat (MLE) | 25.11 | nu star (bias corrected) | 21.06 |
| MLE Mean (bias corrected) | 0.257 | MLE Sd (bias corrected) | 0.296 |
| | | Approximate Chi Square Value (0.05) | 11.64 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 10.72 |

**Assuming Gamma Distribution**

| | | | |
|---|---|---|---|
| 95% Approximate Gamma UCL (use when n>=50)) | 0.465 | 95% Adjusted Gamma UCL (use when n<50) | 0.505 |

**Attachment C**
**ProUCL 5.1 Output**

| Lognormal GOF Test | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.888 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.152 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | -3.219 | Mean of logged Data | -2.011 |
| Maximum of Logged Data | 0.588 | SD of logged Data | 1.029 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 0.511 | 90% Chebyshev (MVUE) UCL | 0.409 |
| 95% Chebyshev (MVUE) UCL | 0.497 | 97.5% Chebyshev (MVUE) UCL | 0.619 |
| 99% Chebyshev (MVUE) UCL | 0.858 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 0.456 | 95% Jackknife UCL | 0.471 |
| 95% Standard Bootstrap UCL | 0.449 | 95% Bootstrap-t UCL | 1.152 |
| 95% Hall's Bootstrap UCL | 1.314 | 95% Percentile Bootstrap UCL | 0.486 |
| 95% BCA Bootstrap UCL | 0.63 | | |
| 90% Chebyshev(Mean, Sd) UCL | 0.62 | 95% Chebyshev(Mean, Sd) UCL | 0.785 |
| 97.5% Chebyshev(Mean, Sd) UCL | 1.013 | 99% Chebyshev(Mean, Sd) UCL | 1.461 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Chebyshev (Mean, Sd) UCL | 0.785 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-02-0 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 4.8 | Mean | 28.19 |
| Maximum | 132 | Median | 14.85 |
| SD | 35.44 | Std. Error of Mean | 9.473 |
| Coefficient of Variation | 1.257 | Skewness | 2.272 |
| | | | |
| **Normal GOF Test** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.697 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.284 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 44.96 | 95% Adjusted-CLT UCL (Chen-1995) | 49.91 |
| | | 95% Modified-t UCL (Johnson-1978) | 45.92 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.668 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.759 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.176 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.235 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 1.03 | k star (bias corrected MLE) | 0.857 |
| Theta hat (MLE) | 27.37 | Theta star (bias corrected MLE) | 32.9 |
| nu hat (MLE) | 28.84 | nu star (bias corrected) | 23.99 |
| MLE Mean (bias corrected) | 28.19 | MLE Sd (bias corrected) | 30.45 |
| | | Approximate Chi Square Value (0.05) | 13.84 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 12.83 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 48.85 | 95% Adjusted Gamma UCL (use when n<50) | 52.71 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.925 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.159 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.569 | Mean of logged Data | 2.78 |
| Maximum of Logged Data | 4.883 | SD of logged Data | 1.052 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 64.92 | 90% Chebyshev (MVUE) UCL | 50.92 |
| 95% Chebyshev (MVUE) UCL | 61.97 | 97.5% Chebyshev (MVUE) UCL | 77.32 |
| 99% Chebyshev (MVUE) UCL | 107.5 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 43.77 | 95% Jackknife UCL | 44.96 |
| 95% Standard Bootstrap UCL | 43.49 | 95% Bootstrap-t UCL | 62.81 |
| 95% Hall's Bootstrap UCL | 99.03 | 95% Percentile Bootstrap UCL | 43.66 |
| 95% BCA Bootstrap UCL | 50.16 | | |
| 90% Chebyshev(Mean, Sd) UCL | 56.6 | 95% Chebyshev(Mean, Sd) UCL | 69.48 |
| 97.5% Chebyshev(Mean, Sd) UCL | 87.34 | 99% Chebyshev(Mean, Sd) UCL | 122.4 |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 52.71 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (so \| southern aoc \| 7440-22-4 \| tmet \| surface soil \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 13 |
| Number of Detects | 10 | Number of Non-Detects | 4 |
| Number of Distinct Detects | 10 | Number of Distinct Non-Detects | 4 |
| Minimum Detect | 0.18 | Minimum Non-Detect | 0.17 |
| Maximum Detect | 84.5 | Maximum Non-Detect | 0.3 |
| Variance Detects | 630.8 | Percent Non-Detects | 28.57% |
| Mean Detects | 18.95 | SD Detects | 25.12 |
| Median Detects | 11 | CV Detects | 1.325 |
| Skewness Detects | 2.329 | Kurtosis Detects | 5.965 |
| Mean of Logged Detects | 2.083 | SD of Logged Detects | 1.687 |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.715 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.842 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.262 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.262 | Detected Data Not Normal at 5% Significance Level | |
| **Detected Data Not Normal at 5% Significance Level** | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 13.58 | KM Standard Error of Mean | 6.156 |
| KM SD | 21.85 | 95% KM (BCA) UCL | 24.66 |
| 95% KM (t) UCL | 24.48 | 95% KM (Percentile Bootstrap) UCL | 24.09 |
| 95% KM (z) UCL | 23.71 | 95% KM Bootstrap t UCL | 36.79 |
| 90% KM Chebyshev UCL | 32.05 | 95% KM Chebyshev UCL | 40.42 |
| 97.5% KM Chebyshev UCL | 52.03 | 99% KM Chebyshev UCL | 74.83 |
| **Gamma GOF Tests on Detected Observations Only** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| A-D Test Statistic | 0.186 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.761 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.113 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.277 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 0.703 | k star (bias corrected MLE) | 0.559 |
| Theta hat (MLE) | 26.95 | Theta star (bias corrected MLE) | 33.91 |
| nu hat (MLE) | 14.06 | nu star (bias corrected) | 11.17 |
| Mean (detects) | 18.95 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.01 | Mean | 13.54 |
| Maximum | 84.5 | Median | 4.45 |
| SD | 22.71 | CV | 1.677 |
| k hat (MLE) | 0.286 | k star (bias corrected MLE) | 0.272 |
| Theta hat (MLE) | 47.4 | Theta star (bias corrected MLE) | 49.76 |
| nu hat (MLE) | 7.997 | nu star (bias corrected) | 7.617 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (7.62, α) | 2.515 | Adjusted Chi Square Value (7.62, β) | 2.144 |
| 95% Gamma Approximate UCL (use when n>=50) | 40.99 | 95% Gamma Adjusted UCL (use when n<50) | 48.1 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 13.58 | SD (KM) | 21.85 |
| Variance (KM) | 477.5 | SE of Mean (KM) | 6.156 |
| k hat (KM) | 0.386 | k star (KM) | 0.351 |
| nu hat (KM) | 10.82 | nu star (KM) | 9.835 |
| theta hat (KM) | 35.15 | theta star (KM) | 38.67 |
| 80% gamma percentile (KM) | 21.52 | 90% gamma percentile (KM) | 39.2 |
| 95% gamma percentile (KM) | 59 | 99% gamma percentile (KM) | 109.5 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (9.83, α) | 3.839 | Adjusted Chi Square Value (9.83, β) | 3.357 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 34.8 | 95% Gamma Adjusted KM-UCL (use when n<50) | 39.8 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.927 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.842 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.159 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.262 | Detected Data appear Lognormal at 5% Significance Level | |
| **Detected Data appear Lognormal at 5% Significance Level** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 13.59 | Mean in Log Scale | 1.023 |
| SD in Original Scale | 22.67 | SD in Log Scale | 2.241 |
| 95% t UCL (assumes normality of ROS data) | 24.32 | 95% Percentile Bootstrap UCL | 23.98 |
| 95% BCA Bootstrap UCL | 28.73 | 95% Bootstrap t UCL | 40.92 |
| 95% H-UCL (Log ROS) | 850.8 | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | 0.984 | KM Geo Mean | 2.675 |
| KM SD (logged) | 2.202 | 95% Critical H Value (KM-Log) | 5.083 |
| KM Standard Error of Mean (logged) | 0.62 | 95% H-UCL (KM -Log) | 672.8 |
| KM SD (logged) | 2.202 | 95% Critical H Value (KM-Log) | 5.083 |
| KM Standard Error of Mean (logged) | 0.62 | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 13.56 | Mean in Log Scale | 0.839 |
| SD in Original Scale | 22.69 | SD in Log Scale | 2.479 |
| 95% t UCL (Assumes normality) | 24.3 | 95% H-Stat UCL | 2441 |
| **DL/2 is not a recommended method, provided for comparisons and historical reasons** | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Detected Data appear Gamma Distributed at 5% Significance Level** | | | |
| **Suggested UCL to Use** | | | |
| 95% KM Bootstrap t UCL | 36.79 | Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) | 39.8 |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (so \| southern aoc \| 7440-28-0 \| tmet \| surface soil \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| Number of Detects | 5 | Number of Non-Detects | 9 |
| Number of Distinct Detects | 5 | Number of Distinct Non-Detects | 7 |
| Minimum Detect | 0.045 | Minimum Non-Detect | 0.043 |
| Maximum Detect | 0.15 | Maximum Non-Detect | 1.6 |
| Variance Detects | 0.00191 | Percent Non-Detects | 64.29% |
| Mean Detects | 0.0754 | SD Detects | 0.0437 |
| Median Detects | 0.053 | CV Detects | 0.58 |
| Skewness Detects | 1.791 | Kurtosis Detects | 3.107 |
| Mean of Logged Detects | -2.694 | SD of Logged Detects | 0.494 |

**Attachment C**
**ProUCL 5.1 Output**

| Normal GOF Test on Detects Only | | | |
|---|---|---|---|
| Shapiro Wilk Test Statistic | 0.771 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data appear Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.296 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data appear Normal at 5% Significance Level | |
| Detected Data appear Normal at 5% Significance Level | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 0.0593 | KM Standard Error of Mean | 0.0113 |
| KM SD | 0.032 | 95% KM (BCA) UCL | 0.0802 |
| 95% KM (t) UCL | 0.0793 | 95% KM (Percentile Bootstrap) UCL | 0.0791 |
| 95% KM (z) UCL | 0.0779 | 95% KM Bootstrap t UCL | 0.164 |
| 90% KM Chebyshev UCL | 0.0932 | 95% KM Chebyshev UCL | 0.109 |
| 97.5% KM Chebyshev UCL | 0.13 | 99% KM Chebyshev UCL | 0.172 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.544 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.681 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.315 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.358 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 4.748 | k star (bias corrected MLE) | 2.032 |
| Theta hat (MLE) | 0.0159 | Theta star (bias corrected MLE) | 0.0371 |
| nu hat (MLE) | 47.48 | nu star (bias corrected) | 20.32 |
| Mean (detects) | 0.0754 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.01 | Mean | 0.0369 |
| Maximum | 0.15 | Median | 0.0223 |
| SD | 0.0388 | CV | 1.051 |
| k hat (MLE) | 1.416 | k star (bias corrected MLE) | 1.16 |
| Theta hat (MLE) | 0.026 | Theta star (bias corrected MLE) | 0.0318 |
| nu hat (MLE) | 39.65 | nu star (bias corrected) | 32.49 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (32.49, α) | 20.46 | Adjusted Chi Square Value (32.49, β) | 19.2 |
| 95% Gamma Approximate UCL (use when n>=50) | 0.0586 | 95% Gamma Adjusted UCL (use when n<50) | 0.0624 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 0.0593 | SD (KM) | 0.032 |
| Variance (KM) | 0.00102 | SE of Mean (KM) | 0.0113 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| k hat (KM) | 3.433 | k star (KM) | 2.745 |
| nu hat (KM) | 96.12 | nu star (KM) | 76.86 |
| theta hat (KM) | 0.0173 | theta star (KM) | 0.0216 |
| 80% gamma percentile (KM) | 0.0855 | 90% gamma percentile (KM) | 0.107 |
| 95% gamma percentile (KM) | 0.128 | 99% gamma percentile (KM) | 0.172 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (76.86, α) | 57.67 | Adjusted Chi Square Value (76.86, β) | 55.46 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 0.079 | 95% Gamma Adjusted KM-UCL (use when n<50) | 0.0822 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.85 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.762 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.289 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.343 | Detected Data appear Lognormal at 5% Significance Level | |
| Detected Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 0.044 | Mean in Log Scale | -3.334 |
| SD in Original Scale | 0.0351 | SD in Log Scale | 0.638 |
| 95% t UCL (assumes normality of ROS data) | 0.0606 | 95% Percentile Bootstrap UCL | 0.0597 |
| 95% BCA Bootstrap UCL | 0.0666 | 95% Bootstrap t UCL | 0.0802 |
| 95% H-UCL (Log ROS) | 0.0652 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | -2.918 | KM Geo Mean | 0.054 |
| KM SD (logged) | 0.384 | 95% Critical H Value (KM-Log) | 1.969 |
| KM Standard Error of Mean (logged) | 0.136 | 95% H-UCL (KM -Log) | 0.0718 |
| KM SD (logged) | 0.384 | 95% Critical H Value (KM-Log) | 1.969 |
| KM Standard Error of Mean (logged) | 0.136 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 0.238 | Mean in Log Scale | -2.421 |
| SD in Original Scale | 0.316 | SD in Log Scale | 1.475 |
| 95% t UCL (Assumes normality) | 0.388 | 95% H-Stat UCL | 1.169 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Detected Data appear Normal Distributed at 5% Significance Level | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% KM (t) UCL | 0.0793 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-36-0 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| Number of Detects | 9 | Number of Non-Detects | 5 |
| Number of Distinct Detects | 9 | Number of Distinct Non-Detects | 5 |
| Minimum Detect | 2.8 | Minimum Non-Detect | 0.82 |
| Maximum Detect | 63.7 | Maximum Non-Detect | 0.97 |
| Variance Detects | 340.6 | Percent Non-Detects | 35.71% |
| Mean Detects | 19.1 | SD Detects | 18.46 |
| Median Detects | 11.3 | CV Detects | 0.966 |
| Skewness Detects | 2.093 | Kurtosis Detects | 4.84 |
| Mean of Logged Detects | 2.604 | SD of Logged Detects | 0.889 |
| | | | |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.764 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.284 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Detected Data Not Normal at 5% Significance Level | |
| **Detected Data Not Normal at 5% Significance Level** | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 12.57 | KM Standard Error of Mean | 4.67 |
| KM SD | 16.47 | 95% KM (BCA) UCL | 21.21 |
| 95% KM (t) UCL | 20.84 | 95% KM (Percentile Bootstrap) UCL | 20.19 |
| 95% KM (z) UCL | 20.25 | 95% KM Bootstrap t UCL | 27.62 |
| 90% KM Chebyshev UCL | 26.58 | 95% KM Chebyshev UCL | 32.93 |
| 97.5% KM Chebyshev UCL | 41.73 | 99% KM Chebyshev UCL | 59.03 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.311 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.734 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.186 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.284 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 1.591 | k star (bias corrected MLE) | 1.135 |
| Theta hat (MLE) | 12 | Theta star (bias corrected MLE) | 16.83 |
| nu hat (MLE) | 28.65 | nu star (bias corrected) | 20.43 |
| Mean (detects) | 19.1 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |
| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
| Minimum | 0.01 | Mean | 12.28 |
| Maximum | 63.7 | Median | 8.35 |
| SD | 17.31 | CV | 1.41 |
| k hat (MLE) | 0.281 | k star (bias corrected MLE) | 0.269 |
| Theta hat (MLE) | 43.69 | Theta star (bias corrected MLE) | 45.74 |
| nu hat (MLE) | 7.871 | nu star (bias corrected) | 7.518 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (7.52, α) | 2.459 | Adjusted Chi Square Value (7.52, β) | 2.093 |
| 95% Gamma Approximate UCL (use when n>=50) | 37.55 | 95% Gamma Adjusted UCL (use when n<50) | 44.12 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 12.57 | SD (KM) | 16.47 |
| Variance (KM) | 271.4 | SE of Mean (KM) | 4.67 |
| k hat (KM) | 0.582 | k star (KM) | 0.505 |
| nu hat (KM) | 16.31 | nu star (KM) | 14.15 |
| theta hat (KM) | 21.59 | theta star (KM) | 24.88 |
| 80% gamma percentile (KM) | 20.66 | 90% gamma percentile (KM) | 33.94 |
| 95% gamma percentile (KM) | 48.11 | 99% gamma percentile (KM) | 82.94 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (14.15, α) | 6.671 | Adjusted Chi Square Value (14.15, β) | 6.002 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 26.66 | 95% Gamma Adjusted KM-UCL (use when n<50) | 29.63 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.979 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.829 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.141 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.274 | Detected Data appear Lognormal at 5% Significance Level | |
| Detected Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 12.81 | Mean in Log Scale | 1.813 |
| SD in Original Scale | 16.92 | SD in Log Scale | 1.303 |
| 95% t UCL (assumes normality of ROS data) | 20.82 | 95% Percentile Bootstrap UCL | 21 |
| 95% BCA Bootstrap UCL | 23.28 | 95% Bootstrap t UCL | 29.81 |
| 95% H-UCL (Log ROS) | 47.56 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | 1.603 | KM Geo Mean | 4.968 |
| KM SD (logged) | 1.501 | 95% Critical H Value (KM-Log) | 3.694 |
| KM Standard Error of Mean (logged) | 0.426 | 95% H-UCL (KM -Log) | 71.4 |
| KM SD (logged) | 1.501 | 95% Critical H Value (KM-Log) | 3.694 |
| KM Standard Error of Mean (logged) | 0.426 | | |

**Attachment C**
**ProUCL 5.1 Output**

| DL/2 Statistics | | | |
|---|---|---|---|
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 12.44 | Mean in Log Scale | 1.382 |
| SD in Original Scale | 17.2 | SD in Log Scale | 1.838 |
| 95% t UCL (Assumes normality) | 20.58 | 95% H-Stat UCL | 198.3 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Detected Data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% KM Adjusted Gamma UCL | 29.63 | 95% GROS Adjusted Gamma UCL | 44.12 |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-39-3 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 32.2 | Mean | 229.2 |
| Maximum | 1160 | Median | 118.5 |
| SD | 319.2 | Std. Error of Mean | 85.31 |
| Coefficient of Variation | 1.393 | Skewness | 2.431 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.626 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.33 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 380.3 | 95% Adjusted-CLT UCL (Chen-1995) | 428.8 |
| | | 95% Modified-t UCL (Johnson-1978) | 389.5 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.942 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.761 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.265 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.235 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.974 | k star (bias corrected MLE) | 0.813 |
| Theta hat (MLE) | 235.2 | Theta star (bias corrected MLE) | 281.9 |
| nu hat (MLE) | 27.28 | nu star (bias corrected) | 22.77 |
| MLE Mean (bias corrected) | 229.2 | MLE Sd (bias corrected) | 254.2 |
| | | Approximate Chi Square Value (0.05) | 12.92 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 11.94 |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 404.1 | 95% Adjusted Gamma UCL (use when n<50) | 437.1 |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.926 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.19 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 3.472 | Mean of logged Data | 4.84 |
| Maximum of Logged Data | 7.056 | SD of logged Data | 1.045 |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 501.5 | 90% Chebyshev (MVUE) UCL | 395.8 |
| 95% Chebyshev (MVUE) UCL | 481.4 | 97.5% Chebyshev (MVUE) UCL | 600.2 |
| 99% Chebyshev (MVUE) UCL | 833.6 | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 369.5 | 95% Jackknife UCL | 380.3 |
| 95% Standard Bootstrap UCL | 363.5 | 95% Bootstrap-t UCL | 807.6 |
| 95% Hall's Bootstrap UCL | 1029 | 95% Percentile Bootstrap UCL | 381.3 |
| 95% BCA Bootstrap UCL | 419.9 | | |
| 90% Chebyshev(Mean, Sd) UCL | 485.1 | 95% Chebyshev(Mean, Sd) UCL | 601.1 |
| 97.5% Chebyshev(Mean, Sd) UCL | 762 | 99% Chebyshev(Mean, Sd) UCL | 1078 |
| **Suggested UCL to Use** | | | |
| 95% Chebyshev (Mean, Sd) UCL | 601.1 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |

**Attachment C**
**ProUCL 5.1 Output**

| Conc (so \| southern aoc \| 7440-43-9 \| tmet \| surface soil \| yes) | | | |
|---|---|---|---|
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| Number of Detects | 13 | Number of Non-Detects | 1 |
| Number of Distinct Detects | 13 | Number of Distinct Non-Detects | 1 |
| Minimum Detect | 0.21 | Minimum Non-Detect | 0.16 |
| Maximum Detect | 21.6 | Maximum Non-Detect | 0.16 |
| Variance Detects | 66.63 | Percent Non-Detects | 7.143% |
| Mean Detects | 7.392 | SD Detects | 8.163 |
| Median Detects | 3.9 | CV Detects | 1.104 |
| Skewness Detects | 0.989 | Kurtosis Detects | -0.662 |
| Mean of Logged Detects | 1.115 | SD of Logged Detects | 1.64 |
| | | | |
| **Normal GOF Test on Detects Only** | | | |
| Shapiro Wilk Test Statistic | 0.801 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.245 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.234 | Detected Data Not Normal at 5% Significance Level | |
| Detected Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |
| KM Mean | 6.876 | KM Standard Error of Mean | 2.165 |
| KM SD | 7.783 | 95% KM (BCA) UCL | 10.41 |
| 95% KM (t) UCL | 10.71 | 95% KM (Percentile Bootstrap) UCL | 10.29 |
| 95% KM (z) UCL | 10.44 | 95% KM Bootstrap t UCL | 11.96 |
| 90% KM Chebyshev UCL | 13.37 | 95% KM Chebyshev UCL | 16.31 |
| 97.5% KM Chebyshev UCL | 20.4 | 99% KM Chebyshev UCL | 28.42 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| A-D Test Statistic | 0.314 | **Anderson-Darling GOF Test** | |
| 5% A-D Critical Value | 0.775 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.134 | **Kolmogorov-Smirnov GOF** | |
| 5% K-S Critical Value | 0.247 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 0.685 | k star (bias corrected MLE) | 0.578 |
| Theta hat (MLE) | 10.8 | Theta star (bias corrected MLE) | 12.79 |
| nu hat (MLE) | 17.8 | nu star (bias corrected) | 15.02 |
| Mean (detects) | 7.392 | | |
| | | | |
| **Gamma ROS Statistics using Imputed Non-Detects** | | | |
| GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs | | | |
| GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20) | | | |
| For such situations, GROS method may yield incorrect values of UCLs and BTVs | | | |
| This is especially true when the sample size is small. | | | |

**Attachment C**
**ProUCL 5.1 Output**

| For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates | | | |
|---|---|---|---|
| Minimum | 0.01 | Mean | 6.865 |
| Maximum | 21.6 | Median | 3.65 |
| SD | 8.087 | CV | 1.178 |
| k hat (MLE) | 0.518 | k star (bias corrected MLE) | 0.454 |
| Theta hat (MLE) | 13.26 | Theta star (bias corrected MLE) | 15.11 |
| nu hat (MLE) | 14.5 | nu star (bias corrected) | 12.72 |
| Adjusted Level of Significance (β) | 0.0312 | | |
| Approximate Chi Square Value (12.72, α) | 5.708 | Adjusted Chi Square Value (12.72, β) | 5.097 |
| 95% Gamma Approximate UCL (use when n>=50) | 15.3 | 95% Gamma Adjusted UCL (use when n<50) | 17.14 |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 6.876 | SD (KM) | 7.783 |
| Variance (KM) | 60.58 | SE of Mean (KM) | 2.165 |
| k hat (KM) | 0.78 | k star (KM) | 0.661 |
| nu hat (KM) | 21.85 | nu star (KM) | 18.5 |
| theta hat (KM) | 8.811 | theta star (KM) | 10.41 |
| 80% gamma percentile (KM) | 11.32 | 90% gamma percentile (KM) | 17.49 |
| 95% gamma percentile (KM) | 23.9 | 99% gamma percentile (KM) | 39.25 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| Approximate Chi Square Value (18.50, α) | 9.755 | Adjusted Chi Square Value (18.50, β) | 8.922 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 13.04 | 95% Gamma Adjusted KM-UCL (use when n<50) | 14.26 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Shapiro Wilk Test Statistic | 0.918 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.866 | Detected Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.142 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.234 | Detected Data appear Lognormal at 5% Significance Level | |
| **Detected Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 6.868 | Mean in Log Scale | 0.832 |
| SD in Original Scale | 8.084 | SD in Log Scale | 1.897 |
| 95% t UCL (assumes normality of ROS data) | 10.69 | 95% Percentile Bootstrap UCL | 10.52 |
| 95% BCA Bootstrap UCL | 10.58 | 95% Bootstrap t UCL | 11.6 |
| 95% H-UCL (Log ROS) | 145.8 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | 0.904 | KM Geo Mean | 2.47 |
| KM SD (logged) | 1.697 | 95% Critical H Value (KM-Log) | 4.072 |
| KM Standard Error of Mean (logged) | 0.472 | 95% H-UCL (KM -Log) | 70.88 |
| KM SD (logged) | 1.697 | 95% Critical H Value (KM-Log) | 4.072 |
| KM Standard Error of Mean (logged) | 0.472 | | |
| | | | |
| **DL/2 Statistics** | | | |
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Mean in Original Scale | 6.87 | Mean in Log Scale | 0.855 |
| SD in Original Scale | 8.082 | SD in Log Scale | 1.851 |
| 95% t UCL (Assumes normality) | 10.7 | 95% H-Stat UCL | 123.5 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| Nonparametric Distribution Free UCL Statistics | | | |
| Detected Data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| Suggested UCL to Use | | | |
| 95% KM Bootstrap t UCL | 11.96 | Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1) | 14.26 |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| Conc (so \| southern aoc \| 7440-47-3 \| tmet \| surface soil \| yes) | | | |
| | | | |
| General Statistics | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 8 | Mean | 70.82 |
| Maximum | 616 | Median | 19.5 |
| SD | 158.5 | Std. Error of Mean | 42.35 |
| Coefficient of Variation | 2.238 | Skewness | 3.617 |
| | | | |
| Normal GOF Test | | | |
| Shapiro Wilk Test Statistic | 0.411 | Shapiro Wilk GOF Test | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.41 | Lilliefors GOF Test | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| Assuming Normal Distribution | | | |
| 95% Normal UCL | | 95% UCLs (Adjusted for Skewness) | |
| 95% Student's-t UCL | 145.8 | 95% Adjusted-CLT UCL (Chen-1995) | 184.2 |
| | | 95% Modified-t UCL (Johnson-1978) | 152.7 |
| | | | |
| Gamma GOF Test | | | |
| A-D Test Statistic | 1.685 | Anderson-Darling Gamma GOF Test | |
| 5% A-D Critical Value | 0.779 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.264 | Kolmogorov-Smirnov Gamma GOF Test | |
| 5% K-S Critical Value | 0.239 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| Gamma Statistics | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| k hat (MLE) | 0.654 | k star (bias corrected MLE) | 0.562 |
| Theta hat (MLE) | 108.3 | Theta star (bias corrected MLE) | 126.1 |
| nu hat (MLE) | 18.31 | nu star (bias corrected) | 15.72 |
| MLE Mean (bias corrected) | 70.82 | MLE Sd (bias corrected) | 94.51 |
| | | Approximate Chi Square Value (0.05) | 7.766 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 7.036 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 143.4 | 95% Adjusted Gamma UCL (use when n<50) | 158.3 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.853 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.197 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| Data appear Approximate Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.079 | Mean of logged Data | 3.327 |
| Maximum of Logged Data | 6.423 | SD of logged Data | 1.15 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 142.7 | 90% Chebyshev (MVUE) UCL | 101.4 |
| 95% Chebyshev (MVUE) UCL | 124.6 | 97.5% Chebyshev (MVUE) UCL | 156.7 |
| 99% Chebyshev (MVUE) UCL | 219.8 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 140.5 | 95% Jackknife UCL | 145.8 |
| 95% Standard Bootstrap UCL | 137.8 | 95% Bootstrap-t UCL | 496 |
| 95% Hall's Bootstrap UCL | 409.2 | 95% Percentile Bootstrap UCL | 153 |
| 95% BCA Bootstrap UCL | 201.7 | | |
| 90% Chebyshev(Mean, Sd) UCL | 197.9 | 95% Chebyshev(Mean, Sd) UCL | 255.4 |
| 97.5% Chebyshev(Mean, Sd) UCL | 335.3 | 99% Chebyshev(Mean, Sd) UCL | 492.2 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Chebyshev (Mean, Sd) UCL | 255.4 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-48-4 \| tmet \| surface soil \| yes)** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 2.5 | Mean | 4.707 |
| Maximum | 15 | Median | 3.5 |
| SD | 3.51 | Std. Error of Mean | 0.938 |
| Coefficient of Variation | 0.746 | Skewness | 2.45 |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.634 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.321 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 6.368 | 95% Adjusted-CLT UCL (Chen-1995) | 6.906 |
| | | 95% Modified-t UCL (Johnson-1978) | 6.471 |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 1.447 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.742 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.26 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.23 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 3.285 | k star (bias corrected MLE) | 2.629 |
| Theta hat (MLE) | 1.433 | Theta star (bias corrected MLE) | 1.791 |
| nu hat (MLE) | 91.98 | nu star (bias corrected) | 73.6 |
| MLE Mean (bias corrected) | 4.707 | MLE Sd (bias corrected) | 2.903 |
| | | Approximate Chi Square Value (0.05) | 54.85 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 52.7 |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 6.317 | 95% Adjusted Gamma UCL (use when n<50) | 6.574 |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.801 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.215 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| Data appear Approximate Lognormal at 5% Significance Level | | | |
| **Lognormal Statistics** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Minimum of Logged Data | 0.916 | Mean of logged Data | 1.389 |
| Maximum of Logged Data | 2.708 | SD of logged Data | 0.522 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 6.175 | 90% Chebyshev (MVUE) UCL | 6.51 |
| 95% Chebyshev (MVUE) UCL | 7.399 | 97.5% Chebyshev (MVUE) UCL | 8.632 |
| 99% Chebyshev (MVUE) UCL | 11.05 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 6.25 | 95% Jackknife UCL | 6.368 |
| 95% Standard Bootstrap UCL | 6.192 | 95% Bootstrap-t UCL | 11.01 |
| 95% Hall's Bootstrap UCL | 14.12 | 95% Percentile Bootstrap UCL | 6.336 |
| 95% BCA Bootstrap UCL | 6.714 | | |
| 90% Chebyshev(Mean, Sd) UCL | 7.521 | 95% Chebyshev(Mean, Sd) UCL | 8.796 |
| 97.5% Chebyshev(Mean, Sd) UCL | 10.57 | 99% Chebyshev(Mean, Sd) UCL | 14.04 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% H-UCL | 6.175 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| **ProUCL computes and outputs H-statistic based UCLs for historical reasons only.** | | | |
| **H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.** | | | |
| **It is therefore recommended to avoid the use of H-statistic based 95% UCLs.** | | | |
| **Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.** | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-50-8 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 5.3 | Mean | 798.2 |
| Maximum | 5100 | Median | 149.5 |
| SD | 1442 | Std. Error of Mean | 385.5 |
| Coefficient of Variation | 1.807 | Skewness | 2.424 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.627 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.319 | **Lilliefors GOF Test** | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| **Data Not Normal at 5% Significance Level** | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 1481 | 95% Adjusted-CLT UCL (Chen-1995) | 1699 |
| | | 95% Modified-t UCL (Johnson-1978) | 1522 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.519 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.819 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.19 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.246 | Detected data appear Gamma Distributed at 5% Significance Level | |
| **Detected data appear Gamma Distributed at 5% Significance Level** | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.365 | k star (bias corrected MLE) | 0.335 |
| Theta hat (MLE) | 2186 | Theta star (bias corrected MLE) | 2386 |
| nu hat (MLE) | 10.23 | nu star (bias corrected) | 9.367 |
| MLE Mean (bias corrected) | 798.2 | MLE Sd (bias corrected) | 1380 |
| | | Approximate Chi Square Value (0.05) | 3.55 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 3.09 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 2106 | 95% Adjusted Gamma UCL (use when n<50) | 2419 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.95 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.117 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| **Data appear Lognormal at 5% Significance Level** | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 1.668 | Mean of logged Data | 4.854 |
| Maximum of Logged Data | 8.537 | SD of logged Data | 2.259 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 42714 | 90% Chebyshev (MVUE) UCL | 3129 |
| 95% Chebyshev (MVUE) UCL | 4077 | 97.5% Chebyshev (MVUE) UCL | 5392 |
| 99% Chebyshev (MVUE) UCL | 7976 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| **Data appear to follow a Discernible Distribution at 5% Significance Level** | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 1432 | 95% Jackknife UCL | 1481 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| 95% Standard Bootstrap UCL | 1405 | 95% Bootstrap-t UCL | 2311 |
| 95% Hall's Bootstrap UCL | 3280 | 95% Percentile Bootstrap UCL | 1438 |
| 95% BCA Bootstrap UCL | 1780 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1955 | 95% Chebyshev(Mean, Sd) UCL | 2478 |
| 97.5% Chebyshev(Mean, Sd) UCL | 3206 | 99% Chebyshev(Mean, Sd) UCL | 4634 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 2419 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-62-2 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| | | Number of Missing Observations | 0 |
| Minimum | 11 | Mean | 16.5 |
| Maximum | 51 | Median | 14 |
| SD | 10.08 | Std. Error of Mean | 2.695 |
| Coefficient of Variation | 0.611 | Skewness | 3.546 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.46 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.436 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 21.27 | 95% Adjusted-CLT UCL (Chen-1995) | 23.66 |
| | | 95% Modified-t UCL (Johnson-1978) | 21.7 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 2.301 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.737 | Data Not Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.384 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.229 | Data Not Gamma Distributed at 5% Significance Level | |
| Data Not Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 5.731 | k star (bias corrected MLE) | 4.551 |
| Theta hat (MLE) | 2.879 | Theta star (bias corrected MLE) | 3.626 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| nu hat (MLE) | 160.5 | nu star (bias corrected) | 127.4 |
| MLE Mean (bias corrected) | 16.5 | MLE Sd (bias corrected) | 7.735 |
| | | Approximate Chi Square Value (0.05) | 102.3 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 99.37 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50)) | 20.54 | 95% Adjusted Gamma UCL (use when n<50) | 21.16 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.628 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.346 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Lognormal at 5% Significance Level | |
| Data Not Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.398 | Mean of logged Data | 2.714 |
| Maximum of Logged Data | 3.932 | SD of logged Data | 0.373 |
| | | | |
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 19.81 | 90% Chebyshev (MVUE) UCL | 20.98 |
| 95% Chebyshev (MVUE) UCL | 23.2 | 97.5% Chebyshev (MVUE) UCL | 26.27 |
| 99% Chebyshev (MVUE) UCL | 32.32 | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution (0.05) | | | |
| | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 20.93 | 95% Jackknife UCL | 21.27 |
| 95% Standard Bootstrap UCL | 20.85 | 95% Bootstrap-t UCL | 35.54 |
| 95% Hall's Bootstrap UCL | 39.92 | 95% Percentile Bootstrap UCL | 21.61 |
| 95% BCA Bootstrap UCL | 24.28 | | |
| 90% Chebyshev(Mean, Sd) UCL | 24.58 | 95% Chebyshev(Mean, Sd) UCL | 28.25 |
| 97.5% Chebyshev(Mean, Sd) UCL | 33.33 | 99% Chebyshev(Mean, Sd) UCL | 43.31 |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% Student's-t UCL | 21.27 | or 95% Modified-t UCL | 21.7 |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| | | | |
| | | | |
| **Conc (so \| southern aoc \| 7440-66-6 \| tmet \| surface soil \| yes)** | | | |
| | | | |
| **General Statistics** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| Total Number of Observations | 14 | Number of Distinct Observations | 14 |
| | | Number of Missing Observations | 0 |
| Minimum | 16.4 | Mean | 701.5 |
| Maximum | 4280 | Median | 492 |
| SD | 1106 | Std. Error of Mean | 295.5 |
| Coefficient of Variation | 1.576 | Skewness | 2.943 |
| | | | |
| **Normal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.614 | **Shapiro Wilk GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data Not Normal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.283 | **Lilliefors GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data Not Normal at 5% Significance Level | |
| Data Not Normal at 5% Significance Level | | | |
| | | | |
| **Assuming Normal Distribution** | | | |
| **95% Normal UCL** | | **95% UCLs (Adjusted for Skewness)** | |
| 95% Student's-t UCL | 1225 | 95% Adjusted-CLT UCL (Chen-1995) | 1436 |
| | | 95% Modified-t UCL (Johnson-1978) | 1264 |
| | | | |
| **Gamma GOF Test** | | | |
| A-D Test Statistic | 0.5 | **Anderson-Darling Gamma GOF Test** | |
| 5% A-D Critical Value | 0.788 | Detected data appear Gamma Distributed at 5% Significance Level | |
| K-S Test Statistic | 0.154 | **Kolmogorov-Smirnov Gamma GOF Test** | |
| 5% K-S Critical Value | 0.241 | Detected data appear Gamma Distributed at 5% Significance Level | |
| Detected data appear Gamma Distributed at 5% Significance Level | | | |
| | | | |
| **Gamma Statistics** | | | |
| k hat (MLE) | 0.553 | k star (bias corrected MLE) | 0.482 |
| Theta hat (MLE) | 1269 | Theta star (bias corrected MLE) | 1455 |
| nu hat (MLE) | 15.48 | nu star (bias corrected) | 13.5 |
| MLE Mean (bias corrected) | 701.5 | MLE Sd (bias corrected) | 1010 |
| | | Approximate Chi Square Value (0.05) | 6.227 |
| Adjusted Level of Significance | 0.0312 | Adjusted Chi Square Value | 5.585 |
| | | | |
| **Assuming Gamma Distribution** | | | |
| 95% Approximate Gamma UCL (use when n>=50) | 1520 | 95% Adjusted Gamma UCL (use when n<50) | 1695 |
| | | | |
| **Lognormal GOF Test** | | | |
| Shapiro Wilk Test Statistic | 0.906 | **Shapiro Wilk Lognormal GOF Test** | |
| 5% Shapiro Wilk Critical Value | 0.874 | Data appear Lognormal at 5% Significance Level | |
| Lilliefors Test Statistic | 0.211 | **Lilliefors Lognormal GOF Test** | |
| 5% Lilliefors Critical Value | 0.226 | Data appear Lognormal at 5% Significance Level | |
| Data appear Lognormal at 5% Significance Level | | | |
| | | | |
| **Lognormal Statistics** | | | |
| Minimum of Logged Data | 2.797 | Mean of logged Data | 5.422 |
| Maximum of Logged Data | 8.362 | SD of logged Data | 1.79 |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| **Assuming Lognormal Distribution** | | | |
| 95% H-UCL | 9303 | 90% Chebyshev (MVUE) UCL | 2334 |
| 95% Chebyshev (MVUE) UCL | 2988 | 97.5% Chebyshev (MVUE) UCL | 3897 |
| 99% Chebyshev (MVUE) UCL | 5682 | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data appear to follow a Discernible Distribution at 5% Significance Level | | | |
| **Nonparametric Distribution Free UCLs** | | | |
| 95% CLT UCL | 1188 | 95% Jackknife UCL | 1225 |
| 95% Standard Bootstrap UCL | 1172 | 95% Bootstrap-t UCL | 1883 |
| 95% Hall's Bootstrap UCL | 3043 | 95% Percentile Bootstrap UCL | 1215 |
| 95% BCA Bootstrap UCL | 1439 | | |
| 90% Chebyshev(Mean, Sd) UCL | 1588 | 95% Chebyshev(Mean, Sd) UCL | 1990 |
| 97.5% Chebyshev(Mean, Sd) UCL | 2547 | 99% Chebyshev(Mean, Sd) UCL | 3642 |
| **Suggested UCL to Use** | | | |
| 95% Adjusted Gamma UCL | 1695 | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |
| **Conc (so \| southern aoc \| 7782-49-2 \| tmet \| surface soil \| yes)** | | | |
| **General Statistics** | | | |
| Total Number of Observations | 14 | Number of Distinct Observations | 12 |
| Number of Detects | 2 | Number of Non-Detects | 12 |
| Number of Distinct Detects | 2 | Number of Distinct Non-Detects | 10 |
| Minimum Detect | 0.93 | Minimum Non-Detect | 0.76 |
| Maximum Detect | 4.4 | Maximum Non-Detect | 1 |
| Variance Detects | 6.02 | Percent Non-Detects | 85.71% |
| Mean Detects | 2.665 | SD Detects | 2.454 |
| Median Detects | 2.665 | CV Detects | 0.921 |
| Skewness Detects | N/A | Kurtosis Detects | N/A |
| Mean of Logged Detects | 0.705 | SD of Logged Detects | 1.099 |
| Warning: Data set has only 2 Detected Values. | | | |
| This is not enough to compute meaningful or reliable statistics and estimates. | | | |
| **Normal GOF Test on Detects Only** | | | |
| Not Enough Data to Perform GOF Test | | | |
| **Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs** | | | |

**Attachment C**
**ProUCL 5.1 Output**

| | | | |
|---|---|---|---|
| KM Mean | 1.036 | KM Standard Error of Mean | 0.353 |
| KM SD | 0.934 | 95% KM (BCA) UCL | N/A |
| 95% KM (t) UCL | 1.661 | 95% KM (Percentile Bootstrap) UCL | N/A |
| 95% KM (z) UCL | 1.617 | 95% KM Bootstrap t UCL | N/A |
| 90% KM Chebyshev UCL | 2.096 | 95% KM Chebyshev UCL | 2.576 |
| 97.5% KM Chebyshev UCL | 3.242 | 99% KM Chebyshev UCL | 4.551 |
| | | | |
| **Gamma GOF Tests on Detected Observations Only** | | | |
| Not Enough Data to Perform GOF Test | | | |
| | | | |
| **Gamma Statistics on Detected Data Only** | | | |
| k hat (MLE) | 1.964 | k star (bias corrected MLE) | N/A |
| Theta hat (MLE) | 1.357 | Theta star (bias corrected MLE) | N/A |
| nu hat (MLE) | 7.856 | nu star (bias corrected) | N/A |
| Mean (detects) | 2.665 | | |
| | | | |
| **Estimates of Gamma Parameters using KM Estimates** | | | |
| Mean (KM) | 1.036 | SD (KM) | 0.934 |
| Variance (KM) | 0.873 | SE of Mean (KM) | 0.353 |
| k hat (KM) | 1.229 | k star (KM) | 1.013 |
| nu hat (KM) | 34.41 | nu star (KM) | 28.37 |
| theta hat (KM) | 0.843 | theta star (KM) | 1.022 |
| 80% gamma percentile (KM) | 1.665 | 90% gamma percentile (KM) | 2.377 |
| 95% gamma percentile (KM) | 3.089 | 99% gamma percentile (KM) | 4.739 |
| | | | |
| **Gamma Kaplan-Meier (KM) Statistics** | | | |
| | | Adjusted Level of Significance (β) | 0.0312 |
| Approximate Chi Square Value (28.37, α) | 17.22 | Adjusted Chi Square Value (28.37, β) | 16.07 |
| 95% Gamma Approximate KM-UCL (use when n>=50) | 1.707 | 95% Gamma Adjusted KM-UCL (use when n<50) | 1.828 |
| | | | |
| **Lognormal GOF Test on Detected Observations Only** | | | |
| Not Enough Data to Perform GOF Test | | | |
| | | | |
| **Lognormal ROS Statistics Using Imputed Non-Detects** | | | |
| Mean in Original Scale | 0.411 | Mean in Log Scale | -2.914 |
| SD in Original Scale | 1.173 | SD in Log Scale | 1.657 |
| 95% t UCL (assumes normality of ROS data) | 0.966 | 95% Percentile Bootstrap UCL | 0.978 |
| 95% BCA Bootstrap UCL | 1.408 | 95% Bootstrap t UCL | 19.62 |
| 95% H-UCL (Log ROS) | 1.34 | | |
| | | | |
| **Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution** | | | |
| KM Mean (logged) | -0.13 | KM Geo Mean | 0.878 |
| KM SD (logged) | 0.451 | 95% Critical H Value (KM-Log) | 2.004 |
| KM Standard Error of Mean (logged) | 0.171 | 95% H-UCL (KM -Log) | 1.249 |
| KM SD (logged) | 0.451 | 95% Critical H Value (KM-Log) | 2.004 |
| KM Standard Error of Mean (logged) | 0.171 | | |

**Attachment C**
**ProUCL 5.1 Output**

| DL/2 Statistics | | | |
|---|---|---|---|
| **DL/2 Normal** | | **DL/2 Log-Transformed** | |
| Mean in Original Scale | 0.764 | Mean in Log Scale | -0.591 |
| SD in Original Scale | 1.055 | SD in Log Scale | 0.632 |
| 95% t UCL (Assumes normality) | 1.264 | 95% H-Stat UCL | 1.004 |
| DL/2 is not a recommended method, provided for comparisons and historical reasons | | | |
| | | | |
| **Nonparametric Distribution Free UCL Statistics** | | | |
| Data do not follow a Discernible Distribution at 5% Significance Level | | | |
| | | | |
| **Suggested UCL to Use** | | | |
| 95% KM (Chebyshev) UCL | 2.576 | | |
| | | | |
| Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. | | | |
| Recommendations are based upon data size, data distribution, and skewness. | | | |
| These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). | | | |
| However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician. | | | |

# Attachment D

## Refined Direct Contact Evaluation

**Table 1**
**Refined Direct Contact Evaluation (Northern AOC; Surface Soil, 0 - 2 feet)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Northern AOC |
| **Exposure Medium:** | Soil |
| **Exposure Point:** | Soil (0 – 2 ft) |

| COPEC | CASRN | Frequency of Detection | Refined EPC (mg/kg) | | Refined ESV (mg/kg) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals** | | | | | | | | | | |
| Chromium | 7440-47-3 | 4/4 | 11.5 | MDC | 57 | invertebrate (minimum MATC) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Selenium | 7782-49-2 | 0/4 | 0.87 | LOQ | 4.1 | invertebrate (geometric mean EC20) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Thallium | 7440-28-0 | 4/4 | 0.18 | MDC | 0.5 | generic plant (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |

**Notes:**

CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EC20 = Effects Concentration for 20 percent of test population
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
LOEC = Lowest Observed Effects Concentration
MATC = Maximum Allowable Toxicant Concentration
mg/kg = milligram per kilogram
USEPA = United States Environmental Protection Agency

**References:**

Los Alamos National Laboratory (LANL). 2017. ECORISK Database Release 4.1 (September 2017).
USEPA. 2008. Ecological Soil Screening Level (Eco-SSL) Guidance and Documents. Office of Solid Waste and Emergency Response, Washington, D.C. Published and revised from 2003-2008.

**Table 2**
**Refined Direct Contact Evaluation (Western AOC; Surface Soil, 0 - 2 feet)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Western AOC |
| **Exposure Medium:** | Soil |
| **Exposure Point:** | Soil (0 – 2 ft) |

| COPEC | CASRN | Frequency of Detection | Refined EPC (mg/kg) | | Refined ESV (mg/kg) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals** | | | | | | | | | | |
| Chromium | 7440-47-3 | 4/4 | 11.4 | MDC | 57 | invertebrate (minimum MATC) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Mercury | 7439-97-6 | 4/4 | 0.077 | MDC | 0.5 | earthworm (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |
| Selenium | 7782-49-2 | 0/4 | 0.89 | LOQ | 4.1 | invertebrate (geometric mean EC20) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Thallium | 7440-28-0 | 4/4 | 0.079 | MDC | 0.5 | generic plant (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |

**Notes:**

CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EC20 = Effects Concentration for 20 percent of test population
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
LOEC = Lowest Observed Effects Concentration
MATC = Maximum Allowable Toxicant Concentration
mg/kg = milligram per kilogram
USEPA = United States Environmental Protection Agency

**References:**

Los Alamos National Laboratory (LANL). 2017. ECORISK Database Release 4.1 (September 2017).
USEPA. 2008. Ecological Soil Screening Level (Eco-SSL) Guidance and Documents. Office of Solid Waste and Emergency Response, Washington, D.C. Published and revised from 2003-2008.

**Table 3**
**Refined Direct Contact Evaluation (Central AOC; Surface Soil, 0 - 2 feet)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Central AOC |
| **Exposure Medium:** | Soil |
| **Exposure Point:** | Soil (0 – 2 ft) |

| COPEC | CASRN | Frequency of Detection | Refined EPC (mg/kg) | | Refined ESV (mg/kg) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | |
| Benzaldehyde | 100-52-7 | 1/1 | 0.0542 | MDC | 2.3 | see text; modeled using acute aquatic effects (via ECOSAR Class Program) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Total HMW PAHs | HMW-PAH | 2/9 | 19.58 | MDC | 18 | invertebrate (geometric mean MATC and EC10) | USEPA (2008) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| **Total Metals** | | | | | | | | | | |
| Chromium | 7440-47-3 | 9/9 | 79.29 | UCL | 57 | invertebrate (minimum MATC) | USEPA (2008) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Cobalt | 7440-48-4 | 9/9 | 17.8 | UCL | 13 | plant (geometric mean EC20) | USEPA (2008) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Lead | 7439-92-1 | 9/9 | 65.53 | UCL | 1700 | invertebrate (geometric mean MATC) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Manganese | 7439-96-5 | 9/9 | 244.9 | UCL | 450 | invertebrate (geometric mean EC20) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Mercury | 7439-97-6 | 9/9 | 0.183 | UCL | 0.5 | earthworm (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |
| Nickel | 7440-02-0 | 9/9 | 502 | MDC | 280 | invertebrate (geometric mean MATC) | USEPA (2008) | **2** | **Yes** | **Refined EPC exceeds refined ESV** |
| Selenium | 7782-49-2 | 1/9 | 1.5 | MDC | 4.1 | invertebrate (geometric mean EC20) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Thallium | 7440-28-0 | 9/9 | 0.115 | UCL | 0.5 | generic plant (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |
| Zinc | 7440-66-6 | 9/9 | 110.2 | UCL | 153 | invertebrate (geometric mean EC10) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |

**Notes:**

CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EC10 = Effects Concentration for 10 percent of test population
EC20 = Effects Concentration for 20 percent of test population
ECOSAR = Ecological Structure Activity Relationships
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
LOEC = Lowest Observed Effects Concentration
MATC = Maximum Allowable Toxicant Concentration
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit
USEPA = United States Environmental Protection Agency

**References:**

Los Alamos National Laboratory (LANL). 2017. ECORISK Database Release 4.1 (September 2017).
USEPA. 2008. Ecological Soil Screening Level (Eco-SSL) Guidance and Documents. Office of Solid Waste and Emergency Response, Washington, D.C. Published and revised from 2003-2008.

**Table 4**
**Refined Direct Contact Evaluation (Southern AOC; Surface Soil, 0 - 2 feet)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Southern AOC |
| **Exposure Medium:** | Soil |
| **Exposure Point:** | Soil (0 – 2 ft) |

| COPEC | CASRN | Frequency of Detection | Refined EPC (mg/kg) | | Refined ESV (mg/kg) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pesticides** | | | | | | | | | | |
| alpha-Chlordane | 5103-71-9 | 1/10 | 0.0267 | MDC | 22 | generic plant (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |
| gamma-Chlordane | 5103-74-2 | 1/10 | 0.0346 | MDC | 22 | generic plant (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |
| **Total Metals** | | | | | | | | | | |
| Barium | 7440-39-3 | 14/14 | 601.1 | UCL | 330 | invertebrate (geometric mean EC20) | USEPA (2008) | **2** | **Yes** | **Refined EPC exceeds refined ESV** |
| Chromium | 7440-47-3 | 14/14 | 255.4 | UCL | 57 | invertebrate (minimum MATC) | USEPA (2008) | **4** | **Yes** | **Refined EPC exceeds refined ESV** |
| Cobalt | 7440-48-4 | 14/14 | 6.175 | UCL | 13 | plant (geometric mean EC20) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Copper | 7440-50-8 | 14/14 | 2419 | UCL | 80 | invertebrate (geometric mean MATC and EC10) | USEPA (2008) | **30** | **Yes** | **Refined EPC exceeds refined ESV** |
| Lead | 7439-92-1 | 14/14 | 826.6 | UCL | 1700 | invertebrate (geometric mean MATC) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Manganese | 7439-96-5 | 14/14 | 837.1 | UCL | 450 | invertebrate (geometric mean EC20) | USEPA (2008) | **2** | **Yes** | **Refined EPC exceeds refined ESV** |
| Mercury | 7439-97-6 | 14/14 | 0.785 | UCL | 0.5 | earthworm (LOEC) | LANL (2017) | **2** | **Yes** | **Refined EPC exceeds refined ESV** |
| Nickel | 7440-02-0 | 14/14 | 52.71 | UCL | 280 | invertebrate (geometric mean MATC) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Selenium | 7782-49-2 | 2/14 | 2.576 | UCL | 4.1 | invertebrate (geometric mean EC20) | USEPA (2008) | <1 | No | Refined EPC less than refined ESV |
| Thallium | 7440-28-0 | 5/14 | 0.0793 | UCL | 0.5 | generic plant (LOEC) | LANL (2017) | <1 | No | Refined EPC less than refined ESV |
| Zinc | 7440-66-6 | 14/14 | 1695 | UCL | 153 | invertebrate (geometric mean EC10) | USEPA (2008) | **11** | **Yes** | **Refined EPC exceeds refined ESV** |

**Notes:**

CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EC10 = Effects Concentration for 10 percent of test population
EC20 = Effects Concentration for 20 percent of test population
ECOSAR = Ecological Structure Activity Relationships
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
LOEC = Lowest Observed Effects Concentration
MATC = Maximum Allowable Toxicant Concentration
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit
USEPA = United States Environmental Protection Agency

**References:**

Los Alamos National Laboratory (LANL). 2017. ECORISK Database Release 4.1 (September 2017).
USEPA. 2008. Ecological Soil Screening Level (Eco-SSL) Guidance and Documents. Office of Solid Waste and Emergency Response, Washington, D.C. Published and revised from 2003-2008.

**Table 5**
**Refined Direct Contact Evaluation (Upgradient Drainage; Sediment)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Upgradient Drainage |
| **Exposure Medium:** | Sediment |
| **Exposure Point:** | N/A |

| COPEC | CASRN | Frequency of Detection | Refined EPC (mg/kg) | | Refined ESV (mg/kg) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | |
| Carbon disulfide | 75-15-0 | 1/2 | 0.0096 | MDC | 1.58 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| **Pesticides** | | | | | | | | | | |
| Total DDD/DDE/DDT | TOT-DDT | 2/2 | 0.2139 | MDC | 0.044 | benthic organisms (refined ESV) | USEPA (2018) | **5** | **Yes** | **Refined EPC exceeds refined ESV** |
| **Total Metals** | | | | | | | | | | |
| Antimony | 7440-36-0 | 1/2 | 2.8 | MDC | 25 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Arsenic | 7440-38-2 | 2/2 | 13.3 | MDC | 33 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Barium | 7440-39-3 | 2/2 | 85.2 | MDC | 60 | benthic organisms (refined ESV) | USEPA (2018) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Cadmium | 7440-43-9 | 2/2 | 1.5 | MDC | 5 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Copper | 7440-50-8 | 2/2 | 56.5 | MDC | 149 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Iron | 7439-89-6 | 2/2 | 19400 | MDC | 40000 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Lead | 7439-92-1 | 2/2 | 96.9 | MDC | 128 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Mercury | 7439-97-6 | 2/2 | 0.49 | MDC | 1.1 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Nickel | 7440-02-0 | 2/2 | 18.5 | MDC | 48.6 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Silver | 7440-22-4 | 2/2 | 1.5 | MDC | 1.77 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Zinc | 7440-66-6 | 2/2 | 324 | MDC | 459 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |

**Notes:**

CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
mg/kg = milligram per kilogram
USEPA = United States Environmental Protection Agency

**References:**

USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section, Superfund Division, USEPA Region 4. Originally published November 1995 and last updated March 2018.

**Table 6**
**Refined Direct Contact Evaluation (Downgradient Estuarine; Sediment)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Downgradient Estuarine |
| **Exposure Medium:** | Sediment |
| **Exposure Point:** | N/A |

| COPEC | CASRN | Frequency of Detection | Refined EPC (mg/kg) | | Refined ESV (mg/kg) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | |
| Acetone | 67-64-1 | 15/19 | 0.149 | UCL | 38.133 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Carbon disulfide | 75-15-0 | 16/19 | 0.0531 | UCL | 1.58 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| **Semi-Volatile Organic Compounds (SVOCs)** | | | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | 117-81-7 | 2/19 | 125.4 | UCL | 2.6 | benthic organisms (refined ESV) | USEPA (2018) | **48** | **Yes** | **Refined EPC exceeds refined ESV** |
| Di-n-octyl phthalate | 117-84-0 | 1/19 | 3.08 | MDC | 1.1 | benthic organisms (refined ESV) | USEPA (2018) | **3** | **Yes** | **Refined EPC exceeds refined ESV** |
| **Dioxins and Furans** | | | | | | | | | | |
| Total TEQ (Fish) | TEQ-FISH | 11/11 | 1.33E-06 | UCL | 0.0000005 | benthic organisms (refined ESV) | USEPA (2018) | **3** | **Yes** | **Refined EPC exceeds refined ESV** |
| **Total Metals** | | | | | | | | | | |
| Aluminum | 7429-90-5 | 19/19 | 20392 | UCL | 58000 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Antimony | 7440-36-0 | 0/16 | 2.8 | LOQ | 25 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Arsenic | 7440-38-2 | 19/19 | 12.4 | UCL | 33 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Barium | 7440-39-3 | 19/19 | 43.64 | UCL | 60 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Chromium | 7440-47-3 | 19/19 | 42.58 | UCL | 111 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Copper | 7440-50-8 | 19/19 | 17 | UCL | 149 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Iron | 7439-89-6 | 19/19 | 25332 | UCL | 40000 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Lead | 7439-92-1 | 19/19 | 22.35 | UCL | 128 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Nickel | 7440-02-0 | 19/19 | 19.55 | UCL | 48.6 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Selenium | 7782-49-2 | 7/19 | 1.851 | UCL | 2.9 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |

**Notes:**

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COPEC = Constituent of Potential Ecological Concern
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
mg/kg = milligram per kilogram
UCL = Upper Confidence Limit
USEPA = United States Environmental Protection Agency

**References:**

USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section, Superfund Division, USEPA Region 4. Originally published November 1995 and last updated March 2018.

**Table 7**
**Refined Direct Contact Evaluation (Downgradient Estuarine; Surface Water)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Downgradient Estuarine |
| **Exposure Medium:** | Surface Water |
| **Exposure Point:** | N/A |

| COPEC | CASRN | Frequency of Detection | Refined EPC (µg/L) | | Refined ESV (µg/L) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Metals** | | | | | | | | | | |
| Aluminum | 7429-90-5 | 7/7 | 1060 | MDC | 750 | benthic organisms (refined ESV) | USEPA (2018) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Arsenic | 7440-38-2 | 7/7 | 11.7 | MDC | 69 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Barium | 7440-39-3 | 7/7 | 27.6 | MDC | 110 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Cadmium | 7440-43-9 | 0/7 | 1.3 | LOQ | 0.94 | benthic organisms (refined ESV) | USEPA (2018) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Calcium | 7440-70-2 | 7/7 | 266000 | MDC | 1160000 | lowest chronic value x 10 | Suter and Tsao (1996) | <1 | No | Refined EPC less than refined ESV |
| Chromium | 7440-47-3 | 3/7 | 2 | MDC | 16 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Copper | 7440-50-8 | 3/7 | 4.9 | MDC | 4.8 | benthic organisms (refined ESV) | USEPA (2018) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Iron | 7439-89-6 | 7/7 | 1030 | MDC | 1580 | lowest chronic value x 10 | Suter and Tsao (1996) | <1 | No | Refined EPC less than refined ESV |
| Lead | 7439-92-1 | 2/7 | 4 | MDC | 30.1 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Magnesium | 7439-95-4 | 7/7 | 1060000 | MDC | 820000 | lowest chronic value x 10 | Suter and Tsao (1996) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Mercury | 7439-97-6 | 3/7 | 0.091 | MDC | 1.4 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Potassium | 7440-09-7 | 7/7 | 457000 | MDC | 530000 | lowest chronic value x 10 | Suter and Tsao (1996) | <1 | No | Refined EPC less than refined ESV |
| Selenium | 7782-49-2 | 7/7 | 11.8 | MDC | 20 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Silver | 7440-22-4 | 0/7 | 2.6 | LOQ | 0.98 | benthic organisms (refined ESV) | USEPA (2018) | **3** | **Yes** | **Refined EPC exceeds refined ESV** |
| Sodium | 7440-23-5 | 7/7 | 9190000 | MDC | 6800000 | lowest chronic value x 10 | Suter and Tsao (1996) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Thallium | 7440-28-0 | 0/7 | 2.4 | LOQ | 54 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |

**Notes:**
CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency

**References:**
Suter, G.W. II, and Tsao, C.L. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. ES/ER/TM-96/R2.
USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section, Superfund Division, USEPA Region 4. Originally published November 1995 and last updated March 2018.

**Table 8**
**Refined Direct Contact Evaluation (Downgradient Estuarine; Pore Water)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| | |
|---|---|
| **Scenario Timeframe:** | Current and Future |
| **Site:** | Downgradient Estuarine |
| **Exposure Medium:** | Pore Water |
| **Exposure Point:** | N/A |

| COPEC | CASRN | Frequency of Detection | Refined EPC (µg/L) | | Refined ESV (µg/L) | Study Endpoint | Source | Refined HQ | Refined COPEC? | Rationale |
|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)** | | | | | | | | | | |
| Carbon disulfide | 75-15-0 | 4/11 | 16.02 | UCL | 130 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| **Total Metals** | | | | | | | | | | |
| Aluminum | 7429-90-5 | 0/11 | 200000 | LOQ | 750 | benthic organisms (refined ESV) | USEPA (2018) | **267** | **Yes** | **Refined EPC exceeds refined ESV** |
| Antimony | 7440-36-0 | 0/11 | 15000 | LOQ | 180 | secondary acute value | Suter and Tsao (1996) | **83** | **Yes** | **Refined EPC exceeds refined ESV** |
| Arsenic | 7440-38-2 | 11/11 | 24.89 | UCL | 69 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Barium | 7440-39-3 | 11/11 | 35.12 | UCL | 110 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Cadmium | 7440-43-9 | 8/11 | 1.037 | UCL | 0.94 | benthic organisms (refined ESV) | USEPA (2018) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Calcium | 7440-70-2 | 11/11 | 344640 | UCL | 1160000 | lowest chronic value x 10 | Suter and Tsao (1996) | <1 | No | Refined EPC less than refined ESV |
| Chromium | 7440-47-3 | 7/11 | 2.707 | UCL | 16 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Cobalt | 7440-48-4 | 0/11 | 13000 | LOQ | 1500 | secondary acute value | Suter and Tsao (1996) | **9** | **Yes** | **Refined EPC exceeds refined ESV** |
| Copper | 7440-50-8 | 0/11 | 5000 | LOQ | 4.8 | benthic organisms (refined ESV) | USEPA (2018) | **1042** | **Yes** | **Refined EPC exceeds refined ESV** |
| Lead | 7439-92-1 | 0/11 | 9000 | LOQ | 30.1 | benthic organisms (refined ESV) | USEPA (2018) | **299** | **Yes** | **Refined EPC exceeds refined ESV** |
| Magnesium | 7439-95-4 | 11/11 | 1114154 | UCL | 820000 | lowest chronic value x 10 | Suter and Tsao (1996) | **1** | **Yes** | **Refined EPC exceeds refined ESV** |
| Manganese | 7439-96-5 | 11/11 | 86.33 | UCL | 2300 | secondary acute value | Suter and Tsao (1996) | <1 | No | Refined EPC less than refined ESV |
| Mercury | 7439-97-6 | 1/11 | 0.03 | MDC | 1.4 | benthic organisms (refined ESV) | USEPA (2018) | <1 | No | Refined EPC less than refined ESV |
| Potassium | 7440-09-7 | 11/11 | 402603 | UCL | 530000 | lowest chronic value x 10 | Suter and Tsao (1996) | <1 | No | Refined EPC less than refined ESV |
| Selenium | 7782-49-2 | 0/9 | 17000 | LOQ | 20 | benthic organisms (refined ESV) | USEPA (2018) | **850** | **Yes** | **Refined EPC exceeds refined ESV** |
| Silver | 7440-22-4 | 0/11 | 5000 | LOQ | 0.98 | benthic organisms (refined ESV) | USEPA (2018) | **5102** | **Yes** | **Refined EPC exceeds refined ESV** |
| Sodium | 7440-23-5 | 11/11 | 12256703 | UCL | 6800000 | lowest chronic value x 10 | Suter and Tsao (1996) | **2** | **Yes** | **Refined EPC exceeds refined ESV** |
| Thallium | 7440-28-0 | 0/11 | 25000 | LOQ | 54 | benthic organisms (refined ESV) | USEPA (2018) | **463** | **Yes** | **Refined EPC exceeds refined ESV** |

**Notes:**

CASRN = Chemical Abstract Services Registry Number
COPEC = Constituent of Potential Ecological Concern
EPC = Exposure Point Concentration
ESV = Ecological Screening Value
HQ = Hazard Quotient
UCL = Upper Confidence Limit
µg/L = micrograms per liter
USEPA = United States Environmental Protection Agency

**References:**

Suter, G.W. II, and Tsao, C.L. 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision. ES/ER/TM-96/R2.
USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Scientific Support Section, Superfund Division, USEPA Region 4. Originally published November 1995 and last updated March 2018.

# Attachment E

## Refined Dose Rate Models

**Table 1**
**Refined Life History Parameters and Ingestion Rates**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Representative Species | | | Home Range (ha) | Home Range Reference | Area Use Factor (AUF) | Body Weight (kg wet weight) | Dietary Composition | | | | | Ingestion Rates | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Food | | Water | | Substrate | | |
| Common Name | Scientific Name | Food-web classification | | | | | Plant Material | Invert. | Small Mammals | Fish | References | kg dry weight/day | Reference | Liters/day | Reference | % of Dry Intake | kg dry weight/day | Reference |
| **Avian Receptors** | | | | | | | | | | | | | | | | | | |
| Northern bobwhite | *Colinus virginianus* | Terrestrial herbivore | 50.9 | DeGraaf and Rudis (1992) | 1 | 0.15 | 86% | 14% | | | USEPA (1993) | 0.008 | Nagy (2001) (a) | -- | Negligible (b) | 13.9% | 0.00106 | USEPA (2007) (c) |
| American robin | *Turdus migratorius* | Terrestrial invertivore | 0.42 | Sample and Suter (1994) | 1 | 0.077 | 62.5% | 37.5% | | | USEPA (1993) | 0.012 | Nagy (2001) (d) | -- | Negligible (b) | 10.4% | 0.00120 | Beyer et al. (1994) (e) |
| Red-tailed hawk | *Buteo jamaicensis* | Terrestrial carnivore | 233 | Sample and Suter (1994) | 1 | 1.13 | | | 100% | | USEPA (1993) | 0.090 | Nagy (2001) (f) | -- | Negligible (b) | 5.7% | 0.00512 | USEPA (2007) |
| Marsh wren | *Cistothorus palustris* | Aquatic invertivore | 0.006 | DeGraaf and Rudis (1992) | 1 | 0.01 | | 100% | | | USEPA (1993) | 0.003 | Nagy (2001) (d) | 0.003 | Calder and Braun (1983) (g) | 2.0% | 0.00005 | Beyer et al. (1994) (h) |
| Osprey | *Pandion haliaetus* | Aquatic piscivore | 154 | USEPA (1993) | 1 | 1.22 | | | | 100% | USEPA (1993) | 0.094 | Nagy (2001) (d) | 0.067 | Calder and Braun (1983) (g) | 0.0% | 0.00000 | Sample and Suter (1994) |
| **Mammalian Receptors** | | | | | | | | | | | | | | | | | | |
| Meadow vole | *Microtus pennsylvanicus* | Terrestrial herbivore | 0.037 | Sample and Suter (1994) | 1 | 0.037 | 100% | | | | USEPA (1993) | 0.008 | Nagy (2001) (!!) | -- | Negligible (b) | 3.2% | 0.00027 | USEPA (2007) |
| Short-tailed shrew | *Blarina brevicauda* | Terrestrial invertivore | 0.39 | Sample and Suter (1994) | 1 | 0.015 | 17% | 78% | 5% | | USEPA (1993) | 0.002 | Nagy (2001) (i) | -- | Negligible (b) | 3.0% | 0.00006 | USEPA (2007) |
| Red fox | *Vulpes vulpes* | Terrestrial carnivore | 407 | Sample and Suter (1994) | 1 | 4.5 | 7% | 3% | 90% | | USEPA (1993) | 0.170 | Nagy (2001) (j) | -- | Negligible (b) | 2.8% | 0.00477 | Beyer et al. (1994) |
| Raccoon | *Procyon lotor* | Semi-aquatic invertivore | 108 | USEPA (1993) | 1 | 5.2 | | 100% | | | USEPA (1993) | 0.076 | Nagy (2001) (i) | 0.437 | Calder and Braun (1983) (g) | 9.4% | 0.00718 | Beyer et al. (1994) |
| American mink | *Neovison vison* | Semi-aquatic piscivore | 770 | Sample and Suter (1994) | 1 | 1 | | | | 100% | USEPA (1993); Sample and Suter (1994) | 0.049 | Nagy (2001) (j) | 0.099 | Calder and Braun (1983) (g) | 0.0% | 0.00000 | Sample and Suter (1994) |

**Notes:**

Red text indicate Step 3a refinements; ha = hectare; invert. = invertebrates; kg = kilogram; % = percent; USEPA = United States Environmental Protection Agency

(a) Estimated food ingestion rate (kg/day dry weight) for granivorous birds = (0.088*[Body Weight in kg*1000]^0.891)/1000

(b) For terrestrial receptors, the contribution of surface water was considered negligible with prey items consisting of each receptors primary source of dietary water.

(c) Estimated based on a soil consumption rate of mourning dove of 13.9% (USEPA, 2007).

(d) Estimated food ingestion rate (kg/day dry weight) for insectivorous birds = (0.540*[Body Weight in kg*1000]^0.705)/1000

(e) Estimated based on a soil consumption rate of woodcock of 10.4% (Beyer et al., 1994).

(f) Estimated food ingestion rate (kg/day dry weight) for carnivorous birds = (0.849*[Body Weight in kg*1000]^0.663)/1000

(g) For aquatic and semi-aquatic receptors, ingestion rate of surface water from the site (if available) was modeled based on the following equations developed by Caulder and Braun (1983) and as presented in Sample and Suter (1994):
Water ingestion rate (L/day) for birds = 0.059*(Body Weight in kg)^0.67
Water ingestion rate (L/day) for mammals = 0.099*(Body Weight in kg)^0.90

(h) Estimated based on a soil consumption rate of blue-winged teal of <2.0% (Beyer et al., 1994).

(i) Estimated food ingestion rate (kg/day dry weight) for mammalian insectivores = (0.373*[Body Weight in kg*1000]^0.622)/1000

(j) Estimated food ingestion rate (kg/day dry weight) for mammalian carnivores = (0.153*[Body Weight in kg*1000]^0.834)/1000

**References:**


Beyer, W.N., Connor, E.E., and S. Gerould. 1994. Estimates of soil ingestion by wildlife. Journal of Wildlife Management. 58(2):375-382.

Calder, W.A. and E.J. Braun. 1983. Scaling of osmotic regulation in mammals and birds. Am. J.Physiol. 224: Rr601-R606.

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Nagy, K.A. 2001. Food requirements of wild animals: Predictive equations for free-living mammals, reptiles, and birds. Nutrition Abstracts and Reviews, Series B: Livestock Feeds and Feeding, Volume 71, No. 10.

Sample, B.E. and G.W. Suter, II. 1994. Estimating Exposure of Terrestrial Wildlife to Contaminants. ES/ER/TM-125. Oak Ridge National Laboratory, Oak Ridge TN.

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USEPA. 2007. Guidance for Developing Ecological Soil Screening Levels. Attachment 4-1. Exposure Factors and Bioaccumulation Models for Derivation of Wildlife Eco-SSLs. OSWER Directive 9285.7-55. Office of Solid Waste and Emergency Response. Washington, DC. April 2007.

**Table 2**
**Refined Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Northern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Vanadium | N/A | 16.9 | 0.00485 | 0.082 | Bechtel-Jacobs (1998) | 0.042 | 0.71 | Sample et al. (1998a) | 0.0123 | 0.208 | Sample et al. (1998b) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.0558 | Regression | 0.00278 | USEPA (2007) (a) | Modeled | 11.9 | USEPA (2007) (b) | 1 | 11.9 | Travis and Arms (1988) (c) |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(b) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc}$ = 1%, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

(c) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$
When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

**References:**


Bechtel Jacobs Company LLC. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter, II, and T.L. Ashwood. 1998a. Development and Validation of Bioaccumulation Models for Earthworms. Oak Ridge National Laboratory, Oak Ridge TN. 93 pp. ES/ER/TM-220.

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Travis, Curtis C. and Angela D. Arms. 1988. Bioconcentration of Organics in Beef, Milk, andVegetation. Health and Safety Research Division. Oak Ridge National Laboratory. Oak Ridge, Tennessee.

USEPA. 2007. Guidance for Developing Ecological Soil Screening Levels. Office of Solid Waste and Emergency Response, Washington, D.C. November. OSWER Directive 92857-55.

**Table 3**
**Refined Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Western AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Vanadium | N/A | 18.4 | 0.00485 | 0.0892 | Bechtel-Jacobs (1998) | 0.042 | 0.773 | Sample et al. (1998a) | 0.0123 | 0.226 | Sample et al. (1998b) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.085 | Regression | 0.00424 | USEPA (2007) (a) | Modeled | 18.2 | USEPA (2007) (b) | 1 | 18.2 | Travis and Arms (1988) (c) |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(b) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc}$ = 1%, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

(c) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$
When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

**References:**


Bechtel Jacobs Company LLC. 1998. Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-133

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter, II, and T.L. Ashwood. 1998a. Development and Validation of Bioaccumulation Models for Earthworms. Oak Ridge National Laboratory, Oak Ridge TN. 93 pp. ES/ER/TM-220.

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, and G.W. Suter, II. 1998b. Development and Validation of Bioaccumulation Models for Small Mammals. Oak Ridge National Laboratory, Oak Ridge TN. 89 pp. ES/ER/TM-219.

Travis, Curtis C. and Angela D. Arms. 1988. Bioconcentration of Organics in Beef, Milk, andVegetation. Health and Safety Research Division. Oak Ridge National Laboratory. Oak Ridge, Tennessee.

USEPA. 2007. Guidance for Developing Ecological Soil Screening Levels. Office of Solid Waste and Emergency Response, Washington, D.C. November. OSWER Directive 92857-55.

**Table 4**
**Refined Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Chromium | N/A | 79.29 | 0.041 | 3.25 | Bechtel-Jacobs (1998) | 0.306 | 24.3 | Sample et al. (1998a) | Regression | 5.75 | Sample et al. (1998b) (c) |
| Lead | N/A | 65.53 | Regression | 2.77 | Bechtel-Jacobs (1998) (a) | Regression | 23.5 | Sample et al. (1998a) (b) | Regression | 4.74 | Sample et al. (1998b) (c) |
| Nickel | N/A | 502 | Regression | 11.3 | Bechtel-Jacobs (1998) (a) | 1.059 | 532 | Sample et al. (1998a) | Regression | 14.2 | Sample et al. (1998b) (c) |
| Selenium | N/A | 1.5 | Regression | 0.794 | Bechtel-Jacobs (1998) (a) | Regression | 1.25 | Sample et al. (1998a) (b) | Regression | 0.769 | Sample et al. (1998b) (c) |
| Vanadium | N/A | 19.46 | 0.00485 | 0.094 | Bechtel-Jacobs (1998) | 0.042 | 0.82 | Sample et al. (1998a) | 0.0123 | 0.239 | Sample et al. (1998b) |
| Zinc | N/A | 110.2 | Regression | 65.7 | Bechtel-Jacobs (1998) (a) | Regression | 400 | Sample et al. (1998a) (b) | Regression | 130 | Sample et al. (1998b) (c) |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 6.9 | 0.423 | Modeled | 0.042 | USEPA (2007) | 11.2 | 4.7 | USEPA (2007) | 4.83 | 22.9 | USEPA (2007) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.0519 | Regression | 0.00259 | USEPA (2007) (d) | Modeled | 11.1 | USEPA (2007) (e) | 1 | 11.1 | Travis and Arms (1988) (f) |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | N/A | 19.58 | Regression | 3.05 | USEPA (2007) (a) | 2.6 | 50.9 | USEPA (2007) | 0 | 0 | USEPA (2007) (g) |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Lead | -1.328 | 0.561 | Bechtel-Jacobs (1998) |
| Nickel | -2.224 | 0.748 | Bechtel-Jacobs (1998) |
| Selenium | -0.678 | 1.104 | Bechtel-Jacobs (1998) |
| Zinc | 1.575 | 0.555 | Bechtel-Jacobs (1998) |
| Total HMW PAHs | -1.7026 | 0.9469 | USEPA (2007) |

(b) Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Lead | -0.218 | 0.807 | Sample et al. (1998a) |
| Selenium | -0.075 | 0.733 | Sample et al. (1998a) |
| Zinc | 4.449 | 0.328 | Sample et al. (1998a) |

(c) Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]).
If multiple trophic-based models were presented, the best fitting model was applied. Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Chromium | -1.4599 | 0.7338 | Sample et al. (1998b) |
| Lead | -0.6114 | 0.5181 | Sample et al. (1998b) |

**Table 4**
**Refined Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| Nickel | -0.2464 | 0.4658 | Sample et al. (1998b) | | | | | | | | |
| Selenium | -0.4158 | 0.3764 | Sample et al. (1998b) | | | | | | | | |
| Zinc | 4.2479 | 0.1324 | Sample et al. (1998b) | | | | | | | | |

(d) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(e) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww-dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc} = 1\%$, and $CF_{ww-dw}$ (convert wet weight to dry weight) = 16%

(f) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$
When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

(g) Bioaccumulation expected to be minimal due to rapid metabolism of these compounds after ingestion (USEPA, 2007).

**References:**


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**Table 5**
**Refined Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | | | | |
| Antimony | N/A | 29.63 | Regression | 0.94 | USEPA (2007) (a) | 1.00 | 29.6 | USEPA (2007) (b) | Modeling | 0.04720 | USEPA (2007) (c) |
| Cadmium | N/A | 11.96 | Regression | 2.41 | Bechtel-Jacobs (1998) (a) | Regression | 17.3 | Neuhauser et al. (1995) (d) | Regression | 0.918 | Sample et al. (1998b) (e) |
| Chromium | N/A | 255.4 | 0.041 | 10.5 | Bechtel-Jacobs (1998) | 0.306 | 78 | Sample et al. (1998a) | Regression | 13.56 | Sample et al. (1998b) (e) |
| Copper | N/A | 2419 | Regression | 42.0 | Bechtel-Jacobs (1998) (a) | Regression | 41.8 | Sample et al. (1998a) (d) | Regression | 32.9 | Sample et al. (1998b) (e) |
| Lead | N/A | 826.6 | Regression | 11.5 | Bechtel-Jacobs (1998) (a) | Regression | 182 | Sample et al. (1998a) (d) | Regression | 17.6 | Sample et al. (1998b) (e) |
| Nickel | N/A | 52.71 | Regression | 2.10 | Bechtel-Jacobs (1998) (a) | 1.059 | 56 | Sample et al. (1998a) | Regression | 4.96 | Sample et al. (1998b) (e) |
| Selenium | N/A | 2.576 | Regression | 1.44 | Bechtel-Jacobs (1998) (a) | Regression | 1.86 | Sample et al. (1998a) (d) | Regression | 0.94 | Sample et al. (1998b) (e) |
| Silver | N/A | 36.79 | 0.014 | 0.52 | Bechtel-Jacobs (1998) | 2.045 | 75 | Sample et al. (1998a) | 0.004 | 0.15 | Sample et al. (1998b) |
| Vanadium | N/A | 21.27 | 0.00485 | 0.103 | Bechtel-Jacobs (1998) | 0.042 | 0.89 | Sample et al. (1998a) | 0.0123 | 0.262 | Sample et al. (1998b) |
| Zinc | N/A | 1695 | Regression | 299 | Bechtel-Jacobs (1998) (a) | Regression | 980 | Sample et al. (1998a) (d) | Regression | 187 | Sample et al. (1998b) (e) |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 6.9 | 2.061 | Modeled | 0.140 | USEPA (2007) | 11.2 | 23.1 | USEPA (2007) | 4.83 | 111.5 | USEPA (2007) |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 6.8 | 4.10E-05 | Regression | 0.00000432 | USEPA (2007) (f) | Modeled | 0.000848 | USEPA (2007) (g) | 0.158 | 0.000134 | Travis and Arms (1988) (h) |
| Total TEQ (Mammal) | 6.8 | 2.59E-05 | Regression | 0.00000273 | USEPA (2007) (f) | Modeled | 0.000536 | USEPA (2007) (g) | 0.158 | 0.0000849 | Travis and Arms (1988) (h) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 0.0757 | Regression | 0.00377 | USEPA (2007) (f) | Modeled | 16.2 | USEPA (2007) (g) | 1 | 16.2 | Travis and Arms (1988) (h) |

**Notes:**

BAF = Bioaccumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram; UCL = Upper Confidence Limit; USEPA = United States Environmental Protection Agency

(a) Plant tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | B0 | B1 | Data Source for Model |
|---|---|---|---|
| Antimony | -3.233 | 0.937 | USEPA (2007) |
| Cadmium | -0.476 | 0.546 | Bechtel-Jacobs (1998) |
| Copper | 0.669 | 0.394 | Bechtel-Jacobs (1998) |
| Lead | -1.328 | 0.561 | Bechtel-Jacobs (1998) |
| Nickel | -2.224 | 0.748 | Bechtel-Jacobs (1998) |

**Table 5**
**Refined Soil Bioaccumulation Factors and Estimated Concentrations in Prey Items (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Soil EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terrestrial Plants | | | Soil Invertebrates | | | Small Mammals | | |
| | | | $BAF_{plants}$ | Estimated Concentration | Reference | $BAF_{invertebrates}$ | Estimated Concentration | Reference | $BAF_{mammals}$ | Estimated Concentration | Reference |
| Selenium | -0.678 | 1.104 | Bechtel-Jacobs (1998) | | | | | | | | |
| Zinc | 1.575 | 0.555 | Bechtel-Jacobs (1998) | | | | | | | | |

(b) Not available; bioaccumulation factor is assumed to be 1.0 USEPA (2007)

(c) USEPA (2007) suggests using a diet-to-beef model presented in Baes et al. (1984) for inorganics without established uptake models, where:
$BAF_{soil\text{-}to\text{-}beef} = BAF_{soil\text{-}to\text{-}diet\ (plant)} \times 50$ (cattle food intake) $\times F_f$ (diet-to-biota factor)

Diet-to-biota factors presented in Baes et al. (1984) are listed below:

| Chemical | $F_f$ |
|---|---|
| Antimony | 0.001 |

(d) Soil invertebrate tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]). Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Cadmium | 1.21 | 0.66 | Neuhauser et al. (1995) |
| Copper | 1.675 | 0.264 | Sample et al. (1998a) |
| Lead | -0.218 | 0.807 | Sample et al. (1998a) |
| Selenium | -0.075 | 0.733 | Sample et al. (1998a) |
| Zinc | 4.449 | 0.328 | Sample et al. (1998a) |

(e) Small mammal tissue concentrations (mg/kg dry weight) calculated based on regression models, where ln([tissue]) = B0 + B1(ln[soil]).
If multiple trophic-based models were presented, the best fitting model was applied. Slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Data Source for Model |
|---|---|---|---|
| Cadmium | -1.2571 | 0.4723 | Sample et al. (1998b) |
| Chromium | -1.4599 | 0.7338 | Sample et al. (1998b) |
| Copper | 2.1042 | 0.1783 | Sample et al. (1998b) |
| Lead | -0.6114 | 0.5181 | Sample et al. (1998b) |
| Nickel | -0.2464 | 0.4658 | Sample et al. (1998b) |
| Selenium | -0.4158 | 0.3764 | Sample et al. (1998b) |
| Zinc | 4.2479 | 0.1324 | Sample et al. (1998b) |

(f) Plant tissue concentrations (mg/kg dry weight) calculated based on a regression model developed for non-ionic, organic compounds (USEPA, 2007), where:
$\log(BAF) = -0.4057 \times \log K_{ow} + 1.781$; and $\log K_{ow} = 3 – 8$

(g) USEPA (2007) suggests using a soil-to-earthworm model presented for non-ionic, organics without established uptake models, where:
$C_{earthworm} = (10^{[0.87 \times \log K_{ow} - 2.0]})/CF_{ww\text{-}dw} \times C_{soil} \times 1/(f_{oc} \times K_{oc})$; and $\log K_{ow} = 2 – 8$, $f_{oc} = 1\%$, and $CF_{ww\text{-}dw}$ (convert wet weight to dry weight) = 16%

(h) For organics without established uptake models, food-to-tissue uptake was estimated using biotransfer coefficients presented in Travis and Arms (1988) where:
$BAF_{small\ mammals} = 10^{(-7.6 + \log K_{ow})}$

When modeling small mammal tissue concentrations, the highest food source concentration (either plants or invertebrates) was multiplied by $BAF_{small\ mammal}$ to remain protective of all trophic levels.

**References:**


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**Table 6**
**Refined Biota Sediment Accumulation Factors and Estimated Concentrations in Prey Items (Upgradient Drainage)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Sediment EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Aquatic Life Stage Benthic Invertebrates | | | Fish | | |
| | | | $BSAF_{invertebrates}$ | Estimated Concentration | Reference | $BSAF_{fish}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | |
| Lead | N/A | 96.9 | 0.066 | 6.4 | Bechtel and Jacobs (1998) (a) | 0.066 | 6.40 | Assumption (b) |
| Vanadium | N/A | 31.6 | Regression | 2.62 | Hamilton and Buhl (2003a,b) (c) | Regression | 2.62 | Assumption (b) |
| **Pesticides** | | | | | | | | |
| Total DDD/DDE/DDT | 6.9 | 0.2139 | 2.84 | 0.61 | DiToro and Mcgrath (2000) (d) | 13.67 | 2.92 | DiToro and Mcgrath (2000) (d) |

**Notes:**

BSAF = Biota Sediment Accumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram;
USEPA = United States Environmental Protection Agency

(a) Median BSAF for non-depurated invertebrates determined by Bechtel and Jacobs (1998)

(b) Sediment-to-fish BSAFs could not be identified; therefore, concentrations in fish were assumed to be equal to concentrations in benthic invertebrates.

(c) Invertebrate concentrations (mg/kg dry weight) calculated based on regression models, where slopes (B1) and intercepts (B0) are as follows:

| Chemical | BO | B1 | Model | Data Source for Model | |
|---|---|---|---|---|---|
| Vanadium | -1.5311 | 0.7219 | y = B0 + B1 * ln([sediment]) | Hamilton and Buhl (2003a,b) | |

(d) For organic constituents, BSAFs were calculated from sediment organic carbon and lipid normalized BSAF, where:
$BSAF_{norm}$ (kg OC / kg lipid) = $Kow^{0.038}$ (DiToro and McGrath 2000) and BSAF (kg OC / kg lipid) = $BSAF_{norm} \times f_{lipid} \times 1/f_{oc}$ ($f_{lipid}$ = 0.052 and 0.25 [intertebrates and fish, respectively] and $f_{oc}$ = 0.01)
$f_{lipid}$ based on the geometric mean % lipid [dw] for all invertebrate groups (benthics) and all vertebrate groups (fish only) within the USACE's BSAF database filtered only for results including biphenyls, dioxins, furans, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and pesticides/herbicides (USACE, 2017)

**References:**


Bechtel Jacobs Company LLC. 1998. Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-112

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**Table 7**
**Refined Biota Sediment Accumulation Factors and Estimated Concentrations in Prey Items (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | log $K_{ow}$ | Refined Sediment EPC (mg/kg, dry weight) | Estimated Concentrations in Dietary Items of Terrestrial Receptors (mg/kg, dry weight) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Aquatic Life Stage Benthic Invertebrates | | | Fish | | |
| | | | $BSAF_{invertebrates}$ | Estimated Concentration | Reference | $BSAF_{fish}$ | Estimated Concentration | Reference |
| **Metals** | | | | | | | | |
| Aluminum | N/A | 20392 | 1 | 20392 | Assumption (a) | 1 | 20392 | Assumption (b) |
| Chromium | N/A | 42.58 | 0.588 | 25.0 | Bechtel and Jacobs (1998) (c) | 0.588 | 25.0 | Assumption (b) |
| Selenium | N/A | 1.851 | Regression | 2.63 | Hamilton and Buhl (2003a,b) (d) | Regression | 2.63 | Assumption (b) |
| Vanadium | N/A | 51.97 | Regression | 3.75 | Hamilton and Buhl (2003a,b) (d) | Regression | 3.75 | Assumption (b) |
| **Dioxins and Furans** | | | | | | | | |
| Total TEQ (Bird) | 6.8 | 0.00000193 | 2.87 | 0.0000055 | DiToro and Mcgrath (2000) (e) | 13.79 | 0.0000266 | DiToro and Mcgrath (2000) (e) |
| Total TEQ (Mammal) | 6.8 | 0.00000231 | 2.87 | 0.0000066 | DiToro and Mcgrath (2000) (e) | 13.79 | 0.0000319 | DiToro and Mcgrath (2000) (e) |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 7.6 | 125.4 | 2.67 | 335 | DiToro and Mcgrath (2000) (e) | 12.86 | 1612 | DiToro and Mcgrath (2000) (e) |

**Notes:**

BSAF = Biota Sediment Accumulation Factor; EPC = Exposure Point Concentration; kg = kilogram; $K_{ow}$ = n-octanol/water partitioning coefficient; log = base-10; mg = milligram;
USEPA = United States Environmental Protection Agency

(a) Sediment-to-invertebrate BSAFs could not be identified; therefore, concentrations in benthic invertebrates were assumed to be equal to the sediment EPC.

(b) Sediment-to-fish BSAFs could not be identified; therefore, concentrations in fish were assumed to be equal to concentrations in benthic invertebrates.

(c) Median BSAF for non-depurated invertebrates determined by Bechtel and Jacobs (1998)

(d) Invertebrate concentrations (mg/kg dry weight) calculated based on regression models, where slopes (B1) and intercepts (B0) are as follows:

| Chemical | B0 | B1 | Model | Data Source for Model |
|---|---|---|---|---|
| Selenium | -- | 1.422 | y = B1 * [sediment] | Hamilton and Buhl (2003a,b) |
| Vanadium | -1.5311 | 0.7219 | y = B0 + B1 * ln([sediment]) | Hamilton and Buhl (2003a,b) |

(e) For organic constituents, BSAFs were calculated from sediment organic carbon and lipid normalized BSAF, where:
$BSAF_{norm}$ (kg OC / kg lipid) = $Kow^{-0.038}$ (DiToro and McGrath 2000) and BSAF (kg OC / kg lipid) = $BSAF_{norm} \times f_{lipid} \times 1/f_{oc}$ ($f_{lipid}$ = 0.052 and 0.25 [intertebrates and fish, respectively] and $f_{oc}$ = 0.01)
$f_{lipid}$ based on the geometric mean % lipid [dw] for all invertebrate groups (benthics) and all vertebrate groups (fish only) within the USACE's BSAF database filtered only for results including biphenyls, dioxins, furans, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and pesticides/herbicides (USACE, 2017)

**References:**


Bechtel Jacobs Company LLC. 1998. Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendations for the Oak Ridge Reservation. Bechtel Jacobs Company LLC, Oak Ridge, TN. BJC/OR-112

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**Table 8**
**Refined Terrestrial Dose Rate Model Output (Northern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 16.9 | 3.59E-03 | 5.06E-03 | 0.00E+00 | 8.66E-03 | 1.20E-01 | 1.28E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 1.22E-04 | 8.52E-02 | 0.00E+00 | 8.53E-02 | 3.95E-04 | 8.57E-02 | 1.1 | <1 | 11 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 16.9 | 7.68E-03 | 3.99E-02 | 0.00E+00 | 4.76E-02 | 2.64E-01 | 3.11E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 2.61E-04 | 6.71E-01 | 0.00E+00 | 6.71E-01 | 8.70E-04 | 6.72E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 16.9 | 0.00E+00 | 0.00E+00 | 1.65E-02 | 1.65E-02 | 7.65E-02 | 9.30E-02 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 0.00E+00 | 0.00E+00 | 9.48E-01 | 9.48E-01 | 2.53E-04 | 9.48E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 16.9 | 1.84E-02 | 0.00E+00 | 0.00E+00 | 1.84E-02 | 1.21E-01 | 1.40E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 6.24E-04 | 0.00E+00 | 0.00E+00 | 6.24E-04 | 4.00E-04 | 1.02E-03 | 18.3 | <1 | 183 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 16.9 | 1.87E-03 | 7.42E-02 | 1.39E-03 | 7.75E-02 | 6.79E-02 | 1.45E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 6.34E-05 | 1.25E+00 | 8.00E-02 | 1.33E+00 | 2.24E-04 | 1.33E+00 | 18.3 | <1 | 183 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 16.9 | 2.17E-04 | 8.06E-04 | 7.08E-03 | 8.11E-03 | 1.79E-02 | 2.60E-02 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0558 | 7.37E-06 | 1.36E-02 | 4.07E-01 | 4.20E-01 | 5.92E-05 | 4.20E-01 | 18.3 | <1 | 183 | <1 |

**Table 8**
**Refined Terrestrial Dose Rate Model Output (Northern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 9**
**Refined Terrestrial Dose Rate Model Output (Western AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 18.4 | 3.91E-03 | 5.51E-03 | 0.00E+00 | 9.43E-03 | 1.30E-01 | 1.40E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 1.86E-04 | 1.30E-01 | 0.00E+00 | 1.30E-01 | 6.02E-04 | 1.31E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 18.4 | 8.36E-03 | 4.34E-02 | 0.00E+00 | 5.18E-02 | 2.87E-01 | 3.39E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 3.97E-04 | 1.02E+00 | 0.00E+00 | 1.02E+00 | 1.33E-03 | 1.02E+00 | 1.1 | <1 | 11 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 18.4 | 0.00E+00 | 0.00E+00 | 1.80E-02 | 1.80E-02 | 8.33E-02 | 1.01E-01 | 0.344 | <1 | 1.19 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 0.00E+00 | 0.00E+00 | 1.44E+00 | 1.44E+00 | 3.85E-04 | 1.44E+00 | 1.1 | 1 | 11 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 18.4 | 2.00E-02 | 0.00E+00 | 0.00E+00 | 2.00E-02 | 1.32E-01 | 1.52E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 9.50E-04 | 0.00E+00 | 0.00E+00 | 9.50E-04 | 6.10E-04 | 1.56E-03 | 18.3 | <1 | 183 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 18.4 | 2.03E-03 | 8.08E-02 | 1.52E-03 | 8.43E-02 | 7.40E-02 | 1.58E-01 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 9.65E-05 | 1.90E+00 | 1.22E-01 | 2.02E+00 | 3.42E-04 | 2.02E+00 | 18.3 | <1 | 183 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Vanadium | 18.4 | 2.37E-04 | 8.78E-04 | 7.71E-03 | 8.83E-03 | 1.95E-02 | 2.83E-02 | 4.16 | <1 | 5.92 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.085 | 1.12E-05 | 2.07E-02 | 6.20E-01 | 6.40E-01 | 9.01E-05 | 6.40E-01 | 18.3 | <1 | 183 | <1 |

**Table 9**
**Refined Terrestrial Dose Rate Model Output (Western AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 10**
**Refined Terrestrial Dose Rate Model Output (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Chromium | 79.29 | 1.42E-01 | 1.73E-01 | 0.00E+00 | 3.16E-01 | 5.62E-01 | 8.77E-01 | 2.66 | <1 | 15.6 | <1 |
| Lead | 65.53 | 1.21E-01 | 1.68E-01 | 0.00E+00 | 2.89E-01 | 4.64E-01 | 7.53E-01 | 1.63 | <1 | 44.6 | <1 |
| Nickel | 502 | 4.97E-01 | 3.79E+00 | 0.00E+00 | 4.29E+00 | 3.56E+00 | 7.85E+00 | 6.71 | **1** | 18.6 | <1 |
| Selenium | 1.5 | 3.48E-02 | 8.91E-03 | 0.00E+00 | 4.37E-02 | 1.06E-02 | 5.44E-02 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 19.46 | 4.14E-03 | 5.83E-03 | 0.00E+00 | 9.97E-03 | 1.38E-01 | 1.48E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 110.2 | 2.88E+00 | 2.85E+00 | 0.00E+00 | 5.73E+00 | 7.81E-01 | 6.51E+00 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 1.86E-03 | 3.38E-02 | 0.00E+00 | 3.57E-02 | 3.00E-03 | 3.87E-02 | 0.227 | <1 | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 1.13E-04 | 7.92E-02 | 0.00E+00 | 7.93E-02 | 3.68E-04 | 7.97E-02 | 1.1 | <1 | 11 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 1.34E-01 | 3.63E-01 | 0.00E+00 | 4.97E-01 | 1.39E-01 | 6.35E-01 | 2 | <1 | 20 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Chromium | 79.29 | 3.05E-01 | 1.36E+00 | 0.00E+00 | 1.67E+00 | 1.24E+00 | 2.91E+00 | 2.66 | **1** | 15.6 | <1 |
| Lead | 65.53 | 2.59E-01 | 1.32E+00 | 0.00E+00 | 1.58E+00 | 1.02E+00 | 2.60E+00 | 1.63 | **2** | 44.6 | <1 |
| Nickel | 502 | 1.06E+00 | 2.99E+01 | 0.00E+00 | 3.10E+01 | 7.83E+00 | 3.88E+01 | 6.71 | **6** | 18.6 | **2** |
| Selenium | 1.5 | 7.44E-02 | 7.02E-02 | 0.00E+00 | 1.45E-01 | 2.34E-02 | 1.68E-01 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 19.46 | 8.84E-03 | 4.60E-02 | 0.00E+00 | 5.48E-02 | 3.03E-01 | 3.58E-01 | 0.344 | **1** | 1.19 | <1 |
| Zinc | 110.2 | 6.15E+00 | 2.25E+01 | 0.00E+00 | 2.86E+01 | 1.72E+00 | 3.04E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 3.98E-03 | 2.66E-01 | 0.00E+00 | 2.70E-01 | 6.60E-03 | 2.77E-01 | 0.227 | **1** | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 2.42E-04 | 6.24E-01 | 0.00E+00 | 6.24E-01 | 8.09E-04 | 6.25E-01 | 1.1 | <1 | 11 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 2.85E-01 | 2.86E+00 | 0.00E+00 | 3.15E+00 | 3.05E-01 | 3.45E+00 | 2 | **2** | 20 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Chromium | 79.29 | 0.00E+00 | 0.00E+00 | 4.57E-01 | 4.57E-01 | 3.59E-01 | 8.16E-01 | 2.66 | <1 | 15.6 | <1 |
| Lead | 65.53 | 0.00E+00 | 0.00E+00 | 3.76E-01 | 3.76E-01 | 2.97E-01 | 6.73E-01 | 1.63 | <1 | 44.6 | <1 |
| Nickel | 502 | 0.00E+00 | 0.00E+00 | 1.12E+00 | 1.12E+00 | 2.27E+00 | 3.40E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 1.5 | 0.00E+00 | 0.00E+00 | 6.11E-02 | 6.11E-02 | 6.79E-03 | 6.78E-02 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 19.46 | 0.00E+00 | 0.00E+00 | 1.90E-02 | 1.90E-02 | 8.81E-02 | 1.07E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 110.2 | 0.00E+00 | 0.00E+00 | 1.04E+01 | 1.04E+01 | 4.99E-01 | 1.09E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 0.00E+00 | 0.00E+00 | 1.82E+00 | 1.82E+00 | 1.92E-03 | 1.82E+00 | 0.227 | **8** | 4.66 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 0.00E+00 | 0.00E+00 | 8.82E-01 | 8.82E-01 | 2.35E-04 | 8.82E-01 | 1.1 | <1 | 11 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.87E-02 | 8.87E-02 | 2 | <1 | 20 | <1 |

**Table 10**
**Refined Terrestrial Dose Rate Model Output (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Chromium | 79.29 | 7.29E-01 | 0.00E+00 | 0.00E+00 | 7.29E-01 | 5.69E-01 | 1.30E+00 | 2.4 | <1 | 58.2 | <1 |
| Lead | 65.53 | 6.21E-01 | 0.00E+00 | 0.00E+00 | 6.21E-01 | 4.70E-01 | 1.09E+00 | 4.7 | <1 | 186.4 | <1 |
| Nickel | 502 | 2.54E+00 | 0.00E+00 | 0.00E+00 | 2.54E+00 | 3.60E+00 | 6.14E+00 | 1.7 | **4** | 7.7 | <1 |
| Selenium | 1.5 | 1.78E-01 | 0.00E+00 | 0.00E+00 | 1.78E-01 | 1.08E-02 | 1.89E-01 | 0.14 | **1** | 0.44 | <1 |
| Vanadium | 19.46 | 2.12E-02 | 0.00E+00 | 0.00E+00 | 2.12E-02 | 1.40E-01 | 1.61E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 110.2 | 1.47E+01 | 0.00E+00 | 0.00E+00 | 1.47E+01 | 7.91E-01 | 1.55E+01 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 9.52E-03 | 0.00E+00 | 0.00E+00 | 9.52E-03 | 3.03E-03 | 1.26E-02 | 0.147 | <1 | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 5.80E-04 | 0.00E+00 | 0.00E+00 | 5.80E-04 | 3.72E-04 | 9.52E-04 | 18.3 | <1 | 183 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 6.83E-01 | 0.00E+00 | 0.00E+00 | 6.83E-01 | 1.40E-01 | 8.23E-01 | 0.615 | **1** | 18 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Chromium | 79.29 | 7.41E-02 | 2.54E+00 | 3.85E-02 | 2.65E+00 | 3.19E-01 | 2.97E+00 | 2.4 | **1** | 58.2 | <1 |
| Lead | 65.53 | 6.31E-02 | 2.46E+00 | 3.17E-02 | 2.55E+00 | 2.63E-01 | 2.82E+00 | 4.7 | <1 | 186.4 | <1 |
| Nickel | 502 | 2.58E-01 | 5.56E+01 | 9.49E-02 | 5.59E+01 | 2.02E+00 | 5.79E+01 | 1.7 | **34** | 7.7 | **8** |
| Selenium | 1.5 | 1.81E-02 | 1.31E-01 | 5.15E-03 | 1.54E-01 | 6.03E-03 | 1.60E-01 | 0.14 | **1** | 0.44 | <1 |
| Vanadium | 19.46 | 2.15E-03 | 8.54E-02 | 1.60E-03 | 8.92E-02 | 7.82E-02 | 1.67E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 110.2 | 1.50E+00 | 4.18E+01 | 8.74E-01 | 4.42E+01 | 4.43E-01 | 4.46E+01 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 9.67E-04 | 4.95E-01 | 1.53E-01 | 6.50E-01 | 1.70E-03 | 6.51E-01 | 0.147 | **4** | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 5.89E-05 | 1.16E+00 | 7.44E-02 | 1.23E+00 | 2.09E-04 | 1.23E+00 | 18.3 | <1 | 183 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 6.94E-02 | 5.32E+00 | 0.00E+00 | 5.39E+00 | 7.87E-02 | 5.47E+00 | 0.615 | **9** | 18 | <1 |

| Analyte | Refined Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Chromium | 79.29 | 8.62E-03 | 2.76E-02 | 1.96E-01 | 2.32E-01 | 8.41E-02 | 3.16E-01 | 2.4 | <1 | 58.2 | <1 |
| Lead | 65.53 | 7.34E-03 | 2.67E-02 | 1.61E-01 | 1.96E-01 | 6.95E-02 | 2.65E-01 | 4.7 | <1 | 186.4 | <1 |
| Nickel | 502 | 3.00E-02 | 6.04E-01 | 4.82E-01 | 1.12E+00 | 5.32E-01 | 1.65E+00 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 1.5 | 2.11E-03 | 1.42E-03 | 2.62E-02 | 2.97E-02 | 1.59E-03 | 3.13E-02 | 0.14 | <1 | 0.44 | <1 |
| Vanadium | 19.46 | 2.50E-04 | 9.28E-04 | 8.16E-03 | 9.34E-03 | 2.06E-02 | 3.00E-02 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 110.2 | 1.74E-01 | 4.54E-01 | 4.44E+00 | 5.07E+00 | 1.17E-01 | 5.19E+00 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.423 | 1.13E-04 | 5.38E-03 | 7.80E-01 | 7.85E-01 | 4.48E-04 | 7.86E-01 | 0.147 | **5** | 7.65 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0519 | 6.86E-06 | 1.26E-02 | 3.78E-01 | 3.91E-01 | 5.50E-05 | 3.91E-01 | 18.3 | <1 | 183 | <1 |
| **Total Polycyclic Aromatic Hydrocarbons (PAHs)** | | | | | | | | | | | |
| Total HMW PAHs | 19.58 | 8.08E-03 | 5.78E-02 | 0.00E+00 | 6.59E-02 | 2.08E-02 | 8.67E-02 | 0.615 | <1 | 18 | <1 |

**Table 10**
**Refined Terrestrial Dose Rate Model Output (Central AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 11**
**Refined Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Northern bobwhite (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 29.63 | 4.14E-02 | 2.11E-01 | 0.00E+00 | 2.53E-01 | 2.10E-01 | 4.63E-01 | N/A | -- | N/A | -- |
| Cadmium | 11.96 | 1.06E-01 | 1.23E-01 | 0.00E+00 | 2.29E-01 | 8.47E-02 | 3.13E-01 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 255.4 | 4.59E-01 | 5.58E-01 | 0.00E+00 | 1.02E+00 | 1.81E+00 | 2.83E+00 | 2.66 | **1** | 15.6 | <1 |
| Copper | 2419 | 1.84E+00 | 2.98E-01 | 0.00E+00 | 2.14E+00 | 1.71E+01 | 1.93E+01 | 4.05 | **5** | 34.9 | <1 |
| Lead | 826.6 | 5.03E-01 | 1.30E+00 | 0.00E+00 | 1.80E+00 | 5.86E+00 | 7.66E+00 | 1.63 | **5** | 44.6 | <1 |
| Nickel | 52.71 | 9.20E-02 | 3.98E-01 | 0.00E+00 | 4.90E-01 | 3.73E-01 | 8.64E-01 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 2.576 | 6.32E-02 | 1.32E-02 | 0.00E+00 | 7.65E-02 | 1.82E-02 | 9.47E-02 | 0.29 | <1 | 0.61 | <1 |
| Silver | 36.79 | 2.26E-02 | 5.37E-01 | 0.00E+00 | 5.59E-01 | 2.61E-01 | 8.20E-01 | 2.02 | <1 | 60.47 | <1 |
| Vanadium | 21.27 | 4.52E-03 | 6.37E-03 | 0.00E+00 | 1.09E-02 | 1.51E-01 | 1.62E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 1695 | 1.31E+01 | 6.99E+00 | 0.00E+00 | 2.01E+01 | 1.20E+01 | 3.21E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 6.13E-03 | 1.65E-01 | 0.00E+00 | 1.71E-01 | 1.46E-02 | 1.85E-01 | 0.227 | <1 | 4.66 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 1.89E-07 | 6.05E-06 | 0.00E+00 | 6.24E-06 | 2.90E-07 | 6.53E-06 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000259 | 1.20E-07 | 3.82E-06 | 0.00E+00 | 3.94E-06 | 1.84E-07 | 4.13E-06 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0757 | 1.65E-04 | 1.16E-01 | 0.00E+00 | 1.16E-01 | 5.36E-04 | 1.16E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | EPC (mg/kg, dry weight) | American robin (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 29.63 | 8.84E-02 | 1.67E+00 | 0.00E+00 | 1.75E+00 | 4.62E-01 | 2.22E+00 | N/A | -- | N/A | -- |
| Cadmium | 11.96 | 2.26E-01 | 9.70E-01 | 0.00E+00 | 1.20E+00 | 1.86E-01 | 1.38E+00 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 255.4 | 9.81E-01 | 4.39E+00 | 0.00E+00 | 5.38E+00 | 3.98E+00 | 9.36E+00 | 2.66 | **4** | 15.6 | <1 |
| Copper | 2419 | 3.94E+00 | 2.35E+00 | 0.00E+00 | 6.29E+00 | 3.77E+01 | 4.40E+01 | 4.05 | **11** | 34.9 | **1** |
| Lead | 826.6 | 1.08E+00 | 1.02E+01 | 0.00E+00 | 1.13E+01 | 1.29E+01 | 2.42E+01 | 1.63 | **15** | 44.6 | <1 |
| Nickel | 52.71 | 1.97E-01 | 3.14E+00 | 0.00E+00 | 3.34E+00 | 8.22E-01 | 4.16E+00 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 2.576 | 1.35E-01 | 1.04E-01 | 0.00E+00 | 2.40E-01 | 4.02E-02 | 2.80E-01 | 0.29 | <1 | 0.61 | <1 |
| Silver | 36.79 | 4.83E-02 | 4.23E+00 | 0.00E+00 | 4.28E+00 | 5.74E-01 | 4.85E+00 | 2.02 | **2** | 60.47 | <1 |
| Vanadium | 21.27 | 9.67E-03 | 5.02E-02 | 0.00E+00 | 5.99E-02 | 3.32E-01 | 3.92E-01 | 0.344 | **1** | 1.19 | <1 |
| Zinc | 1695 | 2.81E+01 | 5.51E+01 | 0.00E+00 | 8.32E+01 | 2.64E+01 | 1.10E+02 | 66.1 | **2** | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 1.31E-02 | 1.30E+00 | 0.00E+00 | 1.31E+00 | 3.21E-02 | 1.34E+00 | 0.227 | **6** | 4.66 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 4.04E-07 | 4.77E-05 | 0.00E+00 | 4.81E-05 | 6.39E-07 | 4.87E-05 | 0.000014 | **3** | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000259 | 2.56E-07 | 3.01E-05 | 0.00E+00 | 3.04E-05 | 4.04E-07 | 3.08E-05 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0757 | 3.54E-04 | 9.10E-01 | 0.00E+00 | 9.11E-01 | 1.18E-03 | 9.12E-01 | 1.1 | <1 | 11 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red-tailed hawk (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 29.63 | 0.00E+00 | 0.00E+00 | 3.75E-03 | 3.75E-03 | 1.34E-01 | 1.38E-01 | N/A | -- | N/A | -- |
| Cadmium | 11.96 | 0.00E+00 | 0.00E+00 | 7.30E-02 | 7.30E-02 | 5.42E-02 | 1.27E-01 | 1.47 | <1 | 6.35 | <1 |
| Chromium | 255.4 | 0.00E+00 | 0.00E+00 | 1.08E+00 | 1.08E+00 | 1.16E+00 | 2.23E+00 | 2.66 | <1 | 15.6 | <1 |
| Copper | 2419 | 0.00E+00 | 0.00E+00 | 2.61E+00 | 2.61E+00 | 1.10E+01 | 1.36E+01 | 4.05 | **3** | 34.9 | <1 |
| Lead | 826.6 | 0.00E+00 | 0.00E+00 | 1.40E+00 | 1.40E+00 | 3.74E+00 | 5.14E+00 | 1.63 | **3** | 44.6 | <1 |
| Nickel | 52.71 | 0.00E+00 | 0.00E+00 | 3.94E-01 | 3.94E-01 | 2.39E-01 | 6.32E-01 | 6.71 | <1 | 18.6 | <1 |
| Selenium | 2.576 | 0.00E+00 | 0.00E+00 | 7.48E-02 | 7.48E-02 | 1.17E-02 | 8.65E-02 | 0.29 | <1 | 0.61 | <1 |
| Silver | 36.79 | 0.00E+00 | 0.00E+00 | 1.17E-02 | 1.17E-02 | 1.67E-01 | 1.78E-01 | 2.02 | <1 | 60.47 | <1 |
| Vanadium | 21.27 | 0.00E+00 | 0.00E+00 | 2.08E-02 | 2.08E-02 | 9.63E-02 | 1.17E-01 | 0.344 | <1 | 1.19 | <1 |
| Zinc | 1695 | 0.00E+00 | 0.00E+00 | 1.49E+01 | 1.49E+01 | 7.67E+00 | 2.25E+01 | 66.1 | <1 | 171.4 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 0.00E+00 | 0.00E+00 | 8.86E+00 | 8.86E+00 | 9.33E-03 | 8.87E+00 | 0.227 | **39** | 4.66 | **2** |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 0.00E+00 | 0.00E+00 | 1.07E-05 | 1.07E-05 | 1.86E-07 | 1.09E-05 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000259 | 0.00E+00 | 0.00E+00 | 6.75E-06 | 6.75E-06 | 1.17E-07 | 6.86E-06 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0757 | 0.00E+00 | 0.00E+00 | 1.29E+00 | 1.29E+00 | 3.43E-04 | 1.29E+00 | 1.1 | **1** | 11 | <1 |

**Table 11**
**Refined Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Meadow vole (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 29.63 | 2.12E-01 | 0.00E+00 | 0.00E+00 | 2.12E-01 | 2.13E-01 | 4.24E-01 | 0.059 | **7** | 2.76 | <1 |
| Cadmium | 11.96 | 5.40E-01 | 0.00E+00 | 0.00E+00 | 5.40E-01 | 8.58E-02 | 6.26E-01 | 0.77 | <1 | 6.9 | <1 |
| Chromium | 255.4 | 2.35E+00 | 0.00E+00 | 0.00E+00 | 2.35E+00 | 1.83E+00 | 4.18E+00 | 2.4 | **2** | 58.2 | <1 |
| Copper | 2419 | 9.43E+00 | 0.00E+00 | 0.00E+00 | 9.43E+00 | 1.74E+01 | 2.68E+01 | 5.6 | **5** | 82.7 | <1 |
| Lead | 826.6 | 2.57E+00 | 0.00E+00 | 0.00E+00 | 2.57E+00 | 5.93E+00 | 8.50E+00 | 4.7 | **2** | 186.4 | <1 |
| Nickel | 52.71 | 4.71E-01 | 0.00E+00 | 0.00E+00 | 4.71E-01 | 3.78E-01 | 8.49E-01 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 2.576 | 3.23E-01 | 0.00E+00 | 0.00E+00 | 3.23E-01 | 1.85E-02 | 3.42E-01 | 0.14 | **2** | 0.44 | <1 |
| Silver | 36.79 | 1.15E-01 | 0.00E+00 | 0.00E+00 | 1.15E-01 | 2.64E-01 | 3.79E-01 | 6.02 | <1 | 118.62 | <1 |
| Vanadium | 21.27 | 2.31E-02 | 0.00E+00 | 0.00E+00 | 2.31E-02 | 1.53E-01 | 1.76E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 1695 | 6.71E+01 | 0.00E+00 | 0.00E+00 | 6.71E+01 | 1.22E+01 | 7.93E+01 | 75.4 | **1** | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 3.13E-02 | 0.00E+00 | 0.00E+00 | 3.13E-02 | 1.48E-02 | 4.61E-02 | 0.147 | <1 | 7.65 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 9.68E-07 | 0.00E+00 | 0.00E+00 | 9.68E-07 | 2.94E-07 | 1.26E-06 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000259 | 6.11E-07 | 0.00E+00 | 0.00E+00 | 6.11E-07 | 1.86E-07 | 7.97E-07 | 0.000001 | <1 | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0757 | 8.46E-04 | 0.00E+00 | 0.00E+00 | 8.46E-04 | 5.43E-04 | 1.39E-03 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Short-tailed shrew (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 29.63 | 2.15E-02 | 3.10E+00 | 3.16E-04 | 3.12E+00 | 1.19E-01 | 3.24E+00 | 0.059 | **55** | 2.76 | **1** |
| Cadmium | 11.96 | 5.49E-02 | 1.80E+00 | 6.15E-03 | 1.86E+00 | 4.81E-02 | 1.91E+00 | 0.77 | **2** | 6.9 | <1 |
| Chromium | 255.4 | 2.39E-01 | 8.17E+00 | 9.09E-02 | 8.50E+00 | 1.03E+00 | 9.53E+00 | 2.4 | **4** | 58.2 | <1 |
| Copper | 2419 | 9.58E-01 | 4.36E+00 | 2.20E-01 | 5.54E+00 | 9.73E+00 | 1.53E+01 | 5.6 | **3** | 82.7 | <1 |
| Lead | 826.6 | 2.61E-01 | 1.90E+01 | 1.18E-01 | 1.94E+01 | 3.32E+00 | 2.27E+01 | 4.7 | **5** | 186.4 | <1 |
| Nickel | 52.71 | 4.78E-02 | 5.83E+00 | 3.32E-02 | 5.92E+00 | 2.12E-01 | 6.13E+00 | 1.7 | **4** | 7.7 | <1 |
| Selenium | 2.576 | 3.29E-02 | 1.94E-01 | 6.31E-03 | 2.33E-01 | 1.04E-02 | 2.44E-01 | 0.14 | **2** | 0.44 | <1 |
| Silver | 36.79 | 1.17E-02 | 7.86E+00 | 9.86E-04 | 7.88E+00 | 1.48E-01 | 8.03E+00 | 6.02 | **1** | 118.62 | <1 |
| Vanadium | 21.27 | 2.35E-03 | 9.34E-02 | 1.75E-03 | 9.75E-02 | 8.55E-02 | 1.83E-01 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 1695 | 6.82E+00 | 1.02E+02 | 1.25E+00 | 1.11E+02 | 6.81E+00 | 1.17E+02 | 75.4 | **2** | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 3.18E-03 | 2.41E+00 | 7.47E-01 | 3.16E+00 | 8.29E-03 | 3.17E+00 | 0.147 | **22** | 7.65 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 9.83E-08 | 8.86E-05 | 9.00E-07 | 8.96E-05 | 1.65E-07 | 8.98E-05 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000259 | 6.21E-08 | 5.60E-05 | 5.69E-07 | 5.66E-05 | 1.04E-07 | 5.67E-05 | 0.000001 | **57** | 0.00001 | **6** |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0757 | 8.60E-05 | 1.69E+00 | 1.08E-01 | 1.80E+00 | 3.04E-04 | 1.80E+00 | 18.3 | <1 | 183 | <1 |

| Analyte | Maximum Soil EPC (mg/kg, dry weight) | Red fox (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diet | | | | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | Plant Material | Invert. | Small Mammals | $Dose_{diet}$[a] | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | |
| Antimony | 29.63 | 2.50E-03 | 3.37E-02 | 1.61E-03 | 3.78E-02 | 3.14E-02 | 6.92E-02 | 0.059 | **1** | 2.76 | <1 |
| Cadmium | 11.96 | 6.38E-03 | 1.96E-02 | 3.13E-02 | 5.73E-02 | 1.27E-02 | 7.00E-02 | 0.77 | <1 | 6.9 | <1 |
| Chromium | 255.4 | 2.78E-02 | 8.88E-02 | 4.62E-01 | 5.79E-01 | 2.71E-01 | 8.50E-01 | 2.4 | <1 | 58.2 | <1 |
| Copper | 2419 | 1.11E-01 | 4.74E-02 | 1.12E+00 | 1.28E+00 | 2.56E+00 | 3.84E+00 | 5.6 | <1 | 82.7 | <1 |
| Lead | 826.6 | 3.04E-02 | 2.07E-01 | 6.00E-01 | 8.37E-01 | 8.76E-01 | 1.71E+00 | 4.7 | <1 | 186.4 | <1 |
| Nickel | 52.71 | 5.56E-03 | 6.34E-02 | 1.69E-01 | 2.38E-01 | 5.59E-02 | 2.94E-01 | 1.7 | <1 | 7.7 | <1 |
| Selenium | 2.576 | 3.82E-03 | 2.11E-03 | 3.21E-02 | 3.80E-02 | 2.73E-03 | 4.08E-02 | 0.14 | <1 | 0.44 | <1 |
| Silver | 36.79 | 1.37E-03 | 8.55E-02 | 5.02E-03 | 9.18E-02 | 3.90E-02 | 1.31E-01 | 6.02 | <1 | 118.62 | <1 |
| Vanadium | 21.27 | 2.73E-04 | 1.01E-03 | 8.92E-03 | 1.02E-02 | 2.26E-02 | 3.28E-02 | 4.16 | <1 | 5.92 | <1 |
| Zinc | 1695 | 7.94E-01 | 1.11E+00 | 6.38E+00 | 8.29E+00 | 1.80E+00 | 1.01E+01 | 75.4 | <1 | 297.6 | <1 |
| **Pesticides** | | | | | | | | | | | |
| Total DDD/DDE/DDT | 2.061 | 3.70E-04 | 2.62E-02 | 3.80E+00 | 3.83E+00 | 2.19E-03 | 3.83E+00 | 0.147 | **26** | 7.65 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000410 | 1.14E-08 | 9.63E-07 | 4.58E-06 | 5.55E-06 | 4.35E-08 | 5.60E-06 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000259 | 7.23E-09 | 6.09E-07 | 2.89E-06 | 3.51E-06 | 2.75E-08 | 3.54E-06 | 0.000001 | **4** | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 0.0757 | 1.00E-05 | 1.84E-02 | 5.52E-01 | 5.70E-01 | 8.03E-05 | 5.70E-01 | 18.3 | <1 | 183 | <1 |

**Table 11**
**Refined Terrestrial Dose Rate Model Output (Southern AOC)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |

**Table 12**
**Refined Aquatic and Semi-Aquatic Dose Rate Model Output (Upgradient Drainage)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Marsh wren (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Lead | 96.9 | -- | 1.75E+00 | 0.00E+00 | 1.75E+00 | -- | 5.31E-01 | 2.28E+00 | 1.63 | **1** | 44.6 | <1 |
| Vanadium | 31.6 | -- | 7.16E-01 | 0.00E+00 | 7.16E-01 | -- | 1.73E-01 | 8.89E-01 | 0.344 | **3** | 1.19 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 8.00E-01 | 0.00E+00 | 8.00E-01 | -- | 1.17E-03 | 8.02E-01 | 0.227 | **4** | 4.66 | <1 |

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Osprey (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Lead | 96.9 | -- | 0.00E+00 | 4.95E-01 | 4.95E-01 | -- | 0.00E+00 | 4.95E-01 | 1.63 | <1 | 44.6 | <1 |
| Vanadium | 31.6 | -- | 0.00E+00 | 2.03E-01 | 2.03E-01 | -- | 0.00E+00 | 2.03E-01 | 0.344 | <1 | 1.19 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 0.00E+00 | 2.26E-01 | 2.26E-01 | -- | 0.00E+00 | 2.26E-01 | 0.227 | <1 | 4.66 | <1 |

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Raccoon (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Lead | 96.9 | -- | 9.40E-02 | 0.00E+00 | 9.40E-02 | -- | 1.34E-01 | 2.28E-01 | 4.7 | <1 | 186.4 | <1 |
| Vanadium | 31.6 | -- | 3.84E-02 | 0.00E+00 | 3.84E-02 | -- | 4.36E-02 | 8.21E-02 | 4.16 | <1 | 5.92 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 4.30E-02 | 0.00E+00 | 4.30E-02 | -- | 2.95E-04 | 4.33E-02 | 0.147 | <1 | 7.65 | <1 |

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | American Mink (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Lead | 96.9 | -- | 0.00E+00 | 3.11E-01 | 3.11E-01 | -- | 0.00E+00 | 3.11E-01 | 4.7 | <1 | 186.4 | <1 |
| Vanadium | 31.6 | -- | 0.00E+00 | 1.27E-01 | 1.27E-01 | -- | 0.00E+00 | 1.27E-01 | 4.16 | <1 | 5.92 | <1 |
| **Pesticides** | | | | | | | | | | | | |
| Total DDD/DDE/DDT | 0.2139 | -- | 0.00E+00 | 1.42E-01 | 1.42E-01 | -- | 0.00E+00 | 1.42E-01 | 0.147 | <1 | 7.65 | <1 |

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

$EDD_{diet}$ = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day)
$IR_{diet}$ = Ingestion rate of food (kg food ingested per day, dry weight)
B(S)AF = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight)
$C_{soil}$ = COPEC concentration in soil (mg COPEC/kg soil, dry weight)
$DF_i$ = Dietary fraction of food item *i*
AUF = Area use factor accounts for receptor home range
BW = Body weight of the receptor, wet weight
$EDD_{substrate}$ = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day)
$IR_{substrate}$ = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight)
$C_{substrate}$ = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight)

**Table 13**
**Refined Aquatic and Semi-Aquatic Dose Rate Model Output (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Marsh wren (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 20392 | -- | 5.58E+03 | 0.00E+00 | 5.58E+03 | -- | 1.12E+02 | 5.69E+03 | 109.7 | **52** | 1097 | **5** |
| Chromium | 42.58 | 0.002 | 6.85E+00 | 0.00E+00 | 6.85E+00 | 5.39E-04 | 2.33E-01 | 7.09E+00 | 2.66 | **3** | 15.6 | <1 |
| Selenium | 1.851 | 0.0118 | 7.21E-01 | 0.00E+00 | 7.21E-01 | 3.18E-03 | 1.01E-02 | 7.34E-01 | 0.29 | **3** | 0.61 | **1** |
| Vanadium | 51.97 | -- | 1.03E+00 | 0.00E+00 | 1.03E+00 | -- | 2.85E-01 | 1.31E+00 | 0.344 | **4** | 1.19 | **1** |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000019 | -- | 7.28E-06 | 0.00E+00 | 7.28E-06 | -- | 1.06E-08 | 7.29E-06 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000023 | -- | 8.74E-06 | 0.00E+00 | 8.74E-06 | -- | 1.27E-08 | 8.75E-06 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 125.4 | -- | 4.41E+02 | 0.00E+00 | 4.41E+02 | -- | 6.87E-01 | 4.42E+02 | 1.1 | **402** | 11 | **40** |

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Osprey (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 20392 | -- | 0.00E+00 | 1.58E+03 | 1.58E+03 | -- | 0.00E+00 | 1.58E+03 | 109.7 | **14** | 1097 | **1** |
| Chromium | 42.58 | 0.002 | 0.00E+00 | 1.94E+00 | 1.94E+00 | 1.11E-04 | 0.00E+00 | 1.94E+00 | 2.66 | <1 | 15.6 | <1 |
| Selenium | 1.851 | 0.0118 | 0.00E+00 | 2.04E-01 | 2.04E-01 | 6.52E-04 | 0.00E+00 | 2.04E-01 | 0.29 | <1 | 0.61 | <1 |
| Vanadium | 51.97 | -- | 0.00E+00 | 2.90E-01 | 2.90E-01 | -- | 0.00E+00 | 2.90E-01 | 0.344 | <1 | 1.19 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000019 | -- | 0.00E+00 | 2.06E-06 | 2.06E-06 | -- | 0.00E+00 | 2.06E-06 | 0.000014 | <1 | 0.00014 | <1 |
| Total TEQ (Mammal) | 0.0000023 | -- | 0.00E+00 | 2.47E-06 | 2.47E-06 | -- | 0.00E+00 | 2.47E-06 | N/A | -- | N/A | -- |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 125.4 | -- | 0.00E+00 | 1.25E+02 | 1.25E+02 | -- | 0.00E+00 | 1.25E+02 | 1.1 | **113** | 11 | **11** |

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | Raccoon (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 20392 | -- | 3.00E+02 | 0.00E+00 | 3.00E+02 | -- | 2.82E+01 | 3.28E+02 | 1.93 | **170** | 19.3 | **17** |
| Chromium | 42.58 | 0.002 | 3.68E-01 | 0.00E+00 | 3.68E-01 | 1.68E-04 | 5.88E-02 | 4.27E-01 | 2.4 | <1 | 58.2 | <1 |
| Selenium | 1.851 | 0.0118 | 3.87E-02 | 0.00E+00 | 3.87E-02 | 9.91E-04 | 2.56E-03 | 4.22E-02 | 0.14 | <1 | 0.44 | <1 |
| Vanadium | 51.97 | -- | 5.50E-02 | 0.00E+00 | 5.50E-02 | -- | 7.18E-02 | 1.27E-01 | 4.16 | <1 | 5.92 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000019 | -- | 3.91E-07 | 0.00E+00 | 3.91E-07 | -- | 2.66E-09 | 3.93E-07 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000023 | -- | 4.69E-07 | 0.00E+00 | 4.69E-07 | -- | 3.20E-09 | 4.72E-07 | 0.000001 | <1 | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 125.4 | -- | 2.37E+01 | 0.00E+00 | 2.37E+01 | -- | 1.73E-01 | 2.39E+01 | 18.3 | **1** | 183 | <1 |

| Analyte | Refined Sediment EPC (mg/kg, dry weight) | Water Exposure Point Concentration (mg/L) | American Mink (mg/kg bw-day) | | | | | | TRV (mg/kg bw-dw) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Diet | | | Water | Substrate | Total Dose[c] | $TRV_{NOAEL}$ | $HQ_{NOAEL}$ | $TRV_{LOAEL}$ | $HQ_{LOAEL}$ |
| | | | Invert. | Fish | $Dose_{diet}$[a] | $Dose_{water}$ | $Dose_{substrate}$[b] | | | | | |
| **Metals** | | | | | | | | | | | | |
| Aluminum | 20392 | -- | 0.00E+00 | 9.91E+02 | 9.91E+02 | -- | 0.00E+00 | 9.91E+02 | 1.93 | **514** | 19.3 | **51** |
| Chromium | 42.58 | 0.002 | 0.00E+00 | 1.22E+00 | 1.22E+00 | 1.98E-04 | 0.00E+00 | 1.22E+00 | 2.4 | <1 | 58.2 | <1 |
| Selenium | 1.851 | 0.0118 | 0.00E+00 | 1.28E-01 | 1.28E-01 | 1.17E-03 | 0.00E+00 | 1.29E-01 | 0.14 | <1 | 0.44 | <1 |
| Vanadium | 51.97 | -- | 0.00E+00 | 1.82E-01 | 1.82E-01 | -- | 0.00E+00 | 1.82E-01 | 4.16 | <1 | 5.92 | <1 |
| **Dioxins and Furans** | | | | | | | | | | | | |
| Total TEQ (Bird) | 0.0000019 | -- | 0.00E+00 | 1.29E-06 | 1.29E-06 | -- | 0.00E+00 | 1.29E-06 | N/A | -- | N/A | -- |
| Total TEQ (Mammal) | 0.0000023 | -- | 0.00E+00 | 1.55E-06 | 1.55E-06 | -- | 0.00E+00 | 1.55E-06 | 0.000001 | **2** | 0.00001 | <1 |
| **Semi-volatile Organic Compounds (SVOCs)** | | | | | | | | | | | | |
| Bis(2-Ethylhexyl)phthalate | 125.4 | -- | 0.00E+00 | 7.84E+01 | 7.84E+01 | -- | 0.00E+00 | 7.84E+01 | 18.3 | **4** | 183 | <1 |

**Table 13**
**Refined Aquatic and Semi-Aquatic Dose Rate Model Output (Downgradient Estuarine)**
**Ecological Risk Assessment**
**Construction Debris Landfill, Wallops Island, Virginia**

**Notes:**
bw/d = body weight per day; COPEC = Chemical of Potential Ecological Concern; EPC = Exposure Point Concentration; Invert. = Invertebrates;
kg = kilogram; LOAEL = Lowest Observable Adverse Effect Level; mg = milligram; N/A = Not Available; NOAEL = No Observable Adverse Effect Level;
TRV = toxicity reference value; -- = not evaluated

(a) Dietary dose calculated as:

$$EDD_{diet} = \frac{IR_{diet} \times \sum(B[S]AF \times C_{soil} \times DF_i) \times AUF}{BW}$$

(b) Substrate dose calculated as:

$$EDD_{substrate} = \frac{IR_{substrate} \times C_{substrate} \times AUF}{BW}$$

(c) Total dose calculated as:

$$EDD_{total} = EDD_{diet} + EDD_{substrate}$$

**Where:**

| | |
|---|---|
| $EDD_{diet}$ | = Dose of COPEC obtained from the diet (mg COPEC/kg receptor body weight-day) |
| $IR_{diet}$ | = Ingestion rate of food (kg food ingested per day, dry weight) |
| B(S)AF | = Bioaccumulation factor (BAF) or biota-sediment accumulation factor (BSAF), specific to prey type and COPEC (kg substrate/kg food, dry weight) |
| $C_{soil}$ | = COPEC concentration in soil (mg COPEC/kg soil, dry weight) |
| $DF_i$ | = Dietary fraction of food item *i* |
| AUF | = Area use factor accounts for receptor home range |
| BW | = Body weight of the receptor, wet weight |
| $EDD_{substrate}$ | = Dose of COPEC obtained from substrate (mg COPEC/kg receptor body weight-day) |
| $IR_{substrate}$ | = Incidental Ingestion rate of substrate (kg substrate ingested per day, dry weight) |
| $C_{substrate}$ | = COPEC concentration in substrate (mg COPEC/kg substrate, dry weight) |